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YOUNG FOLKS' CYCLOPÆDIA

OF

GAMES AND SPORTS

BY
JOHN D. CHAMPLIN

LATE ASSOCIATE EDITOR OF THE AMERICAN CYCLOPÆDIA

AND

ARTHUR E. BOSTWICK

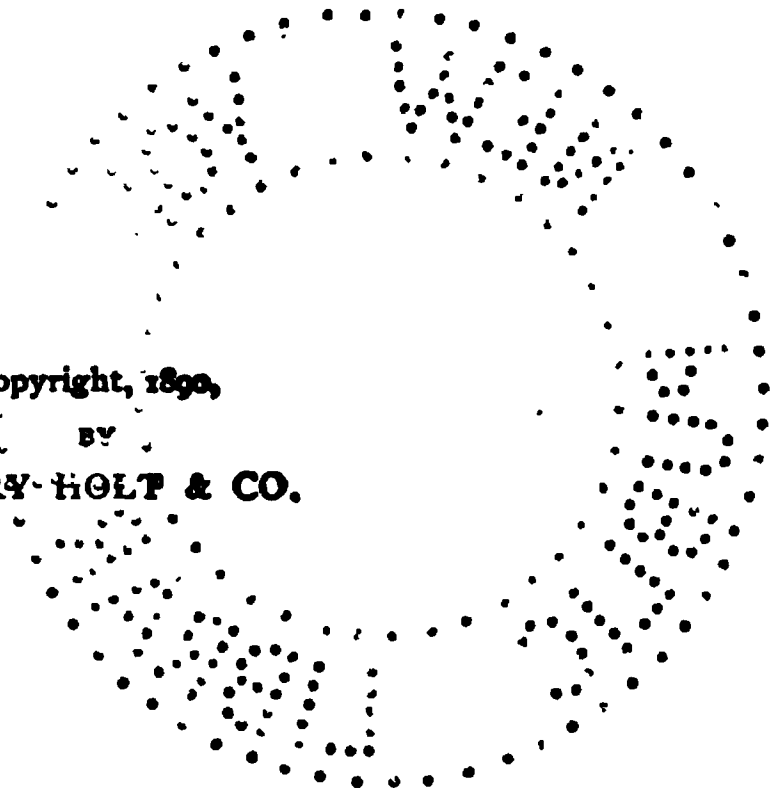
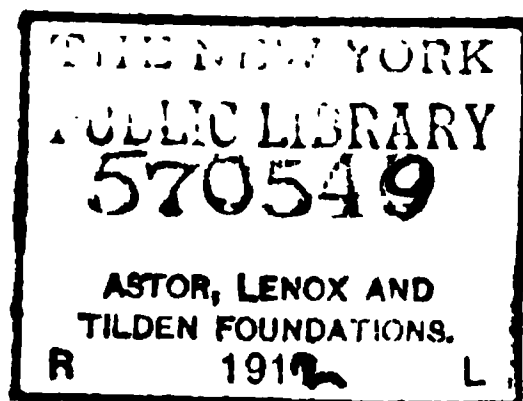
With numerous illustrations

SECOND EDITION, REVISED



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PREFACE TO THE SECOND EDITION.

THE YOUNG FOLKS' CYCLOPÆDIA OF GAMES AND SPORTS is a compendium of recreations of all kinds, including indoor and outdoor games and plays, athletic and rural sports and pastimes, chemical and mechanical experiments and amusements, and every similar thing that can interest a wide-awake boy or girl. Like the other volumes in the Young Folks' Series, it is in cyclopædic style, a novelty in a work of this kind, rendering its articles easy of reference, and combining other advantages never before united in a similar volume. Intended primarily for the family, for the use of children and youth of all ages, it will be of equal value to the adult, as it includes the official rules, given word for word, of athletic sports and standard games, and the official records of athletic meets and events, thus making it a work of reference for the settlement of disputed questions relating to such matters. To insure accuracy, such articles as require it have been revised by competent experts.

Among the features of the work are a brief historical sketch of each game or sport, the description of foreign varieties of each, a full illustration of the text by accurate plans and diagrams, and a system of etymology, as in the other volumes of the series, giving the derivation of names and technical terms. While the "padding" characteristic of too many such works has been rigorously excluded, the endeavor has been to make the explanations full enough for simplicity and clearness. Unlike many other works on sports and games published in this country, which are merely reprints of English books, this cyclopædia has been written for American use from the American standpoint, even such a game as Cricket being treated as it is played in the United States.

While the illustration is very full, no picture has been inserted for its own sake, or otherwise than as an aid to the understanding of the text or the elucidation of different periods of games and sports.

~~15368~~

A large number of works on sports and kindred subjects, in many languages, have been consulted and freely used in the preparation of this book, which is believed to be more comprehensive in its scope than any other similar publication. The editors are indebted to Messrs. A. G. Spalding & Bros. for permission to print the football rules of the University Athletic Club, and the official rules of other athletic sports.

In the present edition the description and rules of all such sports as baseball, football and tennis have been brought carefully down to date, the articles on cycling and golf have been greatly enlarged in view of the increased popularity of both, and other changes have been made to increase the value of the book.

NEW YORK, *January 10, 1899.*


NOTE.—Through an oversight of the editors, credit was not given in the earlier editions to Mr. Dan Beard for sundry devices and suggestions derived from the “American Boys’ Handy Book.”

NEW YORK, *May 19, 1905.*

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CITY OF NEW YORK.

THE
YOUNG FOLKS' CYCLOPÆDIA
OF
GAMES AND SPORTS.

 Words printed in LETTERS LIKE THESE are explained in their alphabetical places.

 The references C. C. T. and C. P. P., are to the "Young Folks' Cyclopædia of Common Things," and the "Young Folks' Cyclopædia of Persons and Places," companion volumes to this, which explain a great deal not coming within the plan of this book.

A

A-B-C. A game played by any number of persons with a pack of CARDS, on each of which are a letter of the alphabet and a picture. The pack is placed face upward on the table, and each player in order names an object in the picture on the top card which begins with the letter on that card. Any one who cannot do so in less than one minute is out. No

one must name an object which has already been named. When all the players but one are out, that one takes the card, and the other cards one by one are treated in like manner, beginning in each case with the player who took the previous card. He who takes most cards is the winner.

ACTING CRAMBO. See CRAMBO.

Agon Board ready for Playing.

ADJECTIVES. A game played by any number of persons. One writes a letter, leaving blank spaces for the adjectives, and then asks the other players, in order, to furnish the missing words without knowing what has been written. The letter is then read aloud. The game may be varied by leaving blanks for other words than adjectives, but in that case each

Position of Men at End of Game.

player must be told what part of speech he is expected to supply.

AGON, or the QUEEN'S GUARDS. A game played by two persons on a six-sided board like that represented in the pictures. Each player has seven pieces, a Queen, which is slightly higher than the others, and her six Guards. Each places his Queen on the corner space in front of him,

and the guards are then arranged alternately on the outermost row as shown in the first illustration. The object of the game is to get a Queen into the center with her Guards ranged on the six spaces around her, as shown in the second figure, and the player who first gets his pieces in this position wins. The players move alternately after the first move has been decided. Any piece may be moved one space forward or sideways, but never backward. If any Guard gets between two hostile pieces so that the three form a straight line on adjacent spaces, such Guard must be taken up for the next move, and placed somewhere on the outermost row. If the Queen gets in a similar situation she must likewise be taken up, but she may be placed anywhere on the board.

In playing, it is well to try to arrange the pieces so that several of the enemy's Guards can be taken up in succession, rather than to throw back one piece alone, for in the latter case that piece is often able to secure a good position. As no piece can be moved backward he who has a man in the rear has an advantage. It is a good plan to keep one man back and hurry the others forward, keeping them together as close as possible.

RULES OF THE GAME.

1. None but the Queens must occupy the center space.
2. Of two or more pieces liable to be thrown back at one time, the Queen, if she be one, must be taken up first, and the others may be taken in any order the player chooses, the removal of each piece counting as a move.
3. If a piece be touched preparatory to moving, it must be moved or the move be lost.
4. If the six Guards are placed in the circle surrounding the center space, leaving the Queen outside, the player of them forfeits the game.

AIR-PUMP, Experiments with an. The common air-pump is described

in C. C. T. A simpler one may be made with a large glass jar or bottle, closed with a rubber stopper having a hole through it. Into the hole put a short piece of glass tubing, over the end of which fit a piece of rubber tubing, about an inch and a half long (See Fig. 1). Exhaust the lungs, apply the mouth to the tube and suck. Pinch the rubber tube tightly to prevent air entering the bottle, and after exhausting the lungs again, repeat the process. If the air is to

be kept exhausted for some time, a pinch-cock (see **CHEMICAL EXPERIMENTS**) should be fastened to the rubber tube. In this way about three-quarters of the air can be removed from the jar.

EXPERIMENTS.

1. Put into the jar a small vaseline or other wide-mouthed bottle, with a piece of thin rubber cloth tied over the top. On exhausting the air, the cloth will bulge up like a balloon (See Fig. 2). This is caused by the air trying to get out of the bottle, owing to the lightening of the pressure above it.

2. Instead of exhausting the air, condense it, by forcing the breath into the bottle, pinching the rubber tube between breaths, as before.

The rubber cloth on the small bottle will bulge inward (see Fig. 3), owing to the increased pressure above it.

3. Replace the short glass tube with a longer one, *c*, having a jet *b* (see **CHEMICAL EXPERIMENTS**) on the end inside the jar. Exhaust the air as before, and then keeping the rubber tube pinched, hold the jar upside down, and put the end of

Fig. 1.

Fig. 2.

Fig. 3.

the rubber tube into a glass of water *d*. On releasing the tube the water will spirt up through the jet into the bottle, making a little fountain (See Fig. 4). This is because the pressure of the air on the surface of the water in the bowl forces it up into the jar, where the pressure is less.

4. Turn the glass tube so that the jet will be outside, seeing that the tube nearly reaches the bottom of the jar. Pour in water enough to cover an inch or two of the end. Put the rubber tube over the jet, and condense the air in the jar, as in Experiment 2. Quickly pull off the rubber tube, and a fountain like that in Experiment 3 will play from the jet (See Fig. 5).

5. In the vaseline bottle used in Experiments 1 and 2, or a similar one, fit a stopper and jet like those used on the large jar in Experiment 4. Partly fill it with water, place it inside the jar, exhaust the air, and a fountain will play from the jet. (See Fig. 6).

6. In the vaseline bottle put a bent tube reaching nearly to the bottom on the inside and about as far down on the outside. Put enough water into both bottle and jar to cover well the ends of the tube. Exhaust the air. All the water will be forced out of the bottle. Let in the air again. More water will run in from the jar than was in the bottle to begin with.

Steam vacuum. A partial vacuum may be produced also by

means of steam. If a little water be boiled in a flask, the steam will drive out all the air, and if the flask be then corked and cooled by placing it in water the steam will condense to water, leaving nothing in its place but a little pool water-vapor. The cork must be put in carefully, and the flask withdrawn from the heat at the same time, otherwise the steam might force the cork out again. By connecting the cork by means of rubber tubing with another bottle or jar, the air in the latter may be greatly rarefied and many of the above experiments tried. If a toy rubber balloon, with no air in it, be fastened to the under side of a glass tube passing through the cork, so that it will be inside of the flask when it is corked, the balloon will swell up and fill the flask as soon as the flask is cooled; the outside air rushing in to fill the vacuum made by condensing the steam.

ALCOHOL, Experiments with. (Read **CHEMICAL EXPERIMENTS**). Alcohol is described in C. C. T. To make it, mix about a quarter of a glass of molasses with a glass and a half of water, add a little yeast, and set the liquid in a warm place for two or three days. During this time it will ferment and bubbles of gas will rise from it, which may be collected if the liquid is in a corked flask with a delivery tube leading to the bottom of a jar. The gas is **CARBONIC ACID**, as may be shown by shaking it with lime-water. The liquid now has alcohol in it, which must be separated from it by **DISTILLING**. Instead of condensing the vapor at once, however, it is first led into a bottle which is kept at a little below the boiling point of water, by being heated over a water bath. Most of the steam condenses in this bottle, but the alcohol, which will not condense at so high a temperature, goes on to the next bottle, which is kept in ice-cold water. Test the liquid thus obtained by trying to light some of it on a glass rod. If it will

Fig. 5.

Fig. 6.

not burn, it is not strong enough, and must be distilled over again. Not more than a quarter of the liquid must be boiled away, for by that time most of the alcohol is gone from it.

EXPERIMENTS

1. Try to dissolve different substances in alcohol. It will be found that oily or gummy substances, which will not dissolve at all in water, will do so in alcohol.

2. Mix equal quantities of alcohol and water together, after measuring each in a graduated tube. The liquid will shrink in mixing so that the mixture will not measure as much as the sum of the two quantities.

3. Drop alcohol on the still surface of a basin of water. There will be a little dimple, or pit, where it strikes, because the heavier and stronger fluid on the surface around it pulls it away.

4. Put a teaspoonful of raw white of egg in a glass, and pour on it about a tablespoonful of alcohol. It will be cooked, as if by heat.

5. Fill a glass with alcohol and into it drop a very little of any aniline dye in the form of powder. These dyes may be obtained of a druggist. The dye will descend into the fluid in a colored thread which will branch out into two or more, and these in turn will divide, so as to resemble the growth of a plant. If the alcohol be contained in a tank with parallel glass sides (see PRISM), the phenomenon may be thrown on to a screen with the HELIOSTAT, and as the lens reverses the object the colored threads will appear to grow upward, thus increasing the resemblance to a tree.

ALICE IN WONDERLAND. A game played by any number of persons, with 52 cards bearing pictures of characters in the story of that name. The cards are divided into three sets: 16 picture-cards with a star in the corner, numbered from 1 to 16; the same picture-cards with-

out the star, numbered in like manner; and 20 cards without pictures, numbered from 1 to 20. In each set the cards rank according to their numbers, but a star card is higher than any other, and a plain picture-card is higher than a plain numbered card. At the beginning of the game, each player is given seven cards. The eldest hand leads. If he lead a picture card, the next must play its mate (from the other picture-set), if possible; otherwise a card from the same set. If a plain numbered card be led, the next player must play another of that set. If he have no card of the set led, he may play what he chooses. Each in turn plays in like manner, but if a picture card has been played it must be followed by its mate if possible, even if the lead was a plain card. If more than one picture card has been played, the first must be mated first, if possible. When each has played one card, he who played the highest card takes the trick and leads for the next one. When the hands have been played, each scores 10 points for each pair among the cards he has taken, 20 for Alice and 20 for the Pool of Tears, if he have them; and he who has taken most cards scores 10. The player with the greatest number of points wins the game.

ALL FOOLS' DAY. April Fool candy can be made by dipping balls of cotton in melted chocolate, so that they will look like chocolate-creams, or by covering a lead pencil, cut in half, with frosting so that it will look like white candy.

April Fool cake can be made by covering a tin pan, turned upside down, with frosting, and an April Fool custard by lining a glass closely with white or yellow paper and covering it with tissue paper on which there is a little white of egg beaten to a froth. An April Fool pie is made of ordinary pie-crust either with nothing but air within it, or stuffed with sawdust. Coarse yellow soap cut into pieces makes very good

April Fool cheese. These deceptions served once or twice during a meal will be almost certain to catch some one. An April Fool whistle can be made as shown in the illustration, and filled with flour, which will fly into the face of any one who tries to blow it. A B (Fig. 1) is a tin tube, stopped by two pieces of cork. One at the end has holes in it and a glass tube through it, as shown in Fig. 2. The other figures explain themselves.

The oldest April Fool trick was to send some one on a fruitless errand,

generally for some absurd or impossible thing, such as a "stick with only one end," a "crooked straight edge," etc. This trick was generally practiced on some young apprentice, and he was sent in search of the object from one place to another till he was tired. Sometimes he was sent to a shoemaker for some "strap oil," which was generally understood to mean a thrashing with a strap.

History. The origin of the custom of deceiving people on the first of April is unknown, though many have tried to explain it. Some say

Fig. 1.

Fig. 2.

Fig. 3.

Fig. 4.

April Fool Whistle.

that the sending boys on silly errands is to commemorate the sending out by Noah of the dove, when it found nothing to rest on. Others connect it with the Hindoo feast on March 31, called Huli, which is celebrated in a similar way. The custom seems to have been taken to England and Germany from France, where an April fool is called *Poisson d'Avril* (April fish). Some think that this refers to the fool's allowing himself to be caught like a fish, but others say it is a corruption of *Passion d'Avril* (April passion or suffering), and that the custom of sending people about on fruitless errands arose from an old Morality,

or Miracle Play, representing Christ sent backward and forward between Herod and Pilate. In France, even the highest dignitaries condescended to take part in the sport. It is related that a high ecclesiastic gathered a great crowd to hear him preach on the first of April, and, when he had ascended the pulpit, made the sign of the cross, cried out "April Fool!" and went down again. In Scotland the April fool is called a "gowk" (cuckoo).

ALL FOURS (Called also Old-Sledge, Seven-Up, and High-Low-Jack). A game played with a full pack of CARDS, which rank as in Whist. It is usually played by two

persons, or by four acting as partners, as in Whist; but it may be played also by three or four persons without partnership. In the two-handed game, the dealer gives each player six cards, three at a time, and turns up the next card as trump. If it be a knave he scores one point at once, as further explained below. The non-dealer then looks at his hand. If he is satisfied with it, he says "I stand," in which case play begins at once; but if not, he says "I beg." The dealer may then either say "Take one," allowing his opponent to score one point before play begins, or he may lay aside the trump and deal three more cards to each, turning up the next as a new trump. If the new trump is of the same suit as the old, three more cards must be dealt again to each player, and so on till a trump card of a different suit is turned. This is called "running the cards for a new trump." In playing, suit must be followed if possible, except when the player chooses to trump. The points that may be made in one hand are four, as follows:

High. The holder of the highest trump out scores one point.

Low. The original holder of the lowest trump out scores one point, whether he takes the trick containing it or not.

Jack. The player that wins the trick containing the knave of trumps, or who turns it up as trump when dealing, scores one point.

Game. The player whose tricks contain cards the sum of whose values is the greatest, scores one point, counting

Ace	as	4
King	"	3
Queen	"	2
Knave	"	1
Ten	"	10

The other cards count nothing toward Game; hence a hand may be played when no Game is made, neither player holding either court cards or

tens. If there be a tie,—that is, when each player holds an equal number for game, it is scored by the eldest hand. It may happen that a single card may score more than one point, or all four points; thus, if a player hold only one face card, the Knave of trumps, and his opponent have no face card, trump, ten, nor Ace, the Knave will score High, Low, Jack, and Game. He who first scores seven points, wins.

In the three and four handed games only the player at the dealer's left has the option of "standing" or "begging," as in the two-handed game, and the method of playing is the same. If new cards are dealt, they must be dealt to each of the players. In the four-handed game, each may play for himself, or two, as partners, against the other two.

RULES OF THE GAME.

1. In cutting for deal, the Ace counts as the highest card.

2. If the dealer expose any card but his own, or make a misdeal, he must deal again.

3. The points must be scored in the order, High, Low, Jack, Game; thus, if the players stand six to six in the score, and one has High, while his opponent has the other three, the one that has High goes out. But when Jack is turned up as trump, it must be scored immediately, thus taking precedence of all other points.

4. A turned-up Jack is to be scored, even if the opponent begs, and the trump is thus changed.

5. No one may beg more than once in a hand, but if the hands are unsatisfactory after the cards have been run, a new deal may had by agreement of all the players, or they may agree to run the cards again; but no suit can be trump that has already been turned as such in the same hand.

6. Should the same suit be turned, in running the cards, till the pack has all been used, there must be a new deal.

7. In the four-handed game, only

the dealer and the player on his left may look at their cards before the latter decides whether to stand or beg, and, if he begs, the others may not look at their hands till the dealer tells whether he will "give one," or run the cards for another trump.

The game is called All Fours from the points that can be made in one deal; High, Low, Jack, Game (or more commonly High-Low-Jack), from the names of the points; and Seven-Up, from the number of points that win the game.

Pitch. A kind of All Fours, in which no trump is turned, the first suit led being considered the trump suit. The eldest hand thus has the privilege of leading or *pitching* the trump, from which the game gets its name. The method of playing is the same as in All Fours, except that there is no begging. In case of a tie for Game, too, neither player can score Game. With these changes, the rules are the same as in All Fours.

Auction Pitch (called also Commercial Pitch). A kind of All Fours, in which the trump card is not turned, but led or *pitched* by the player making the highest bid for the privilege. The game may be played by any number of persons, usually not more than eight. After the deal the eldest hand, who is called the seller, asks each in turn, going toward the left, what he will bid for the privilege of pitching the trump. Each bids as many points as he thinks he can make, and each has but one bid.

The seller, who has the last say, may either sell to the highest bidder—that is, permit him to pitch the trump—or he may decline to sell and pitch the trump himself at the same price offered by the highest bidder; but he is not obliged to outbid him. If he accept the bid, he adds the number of points bid to his own score at once before playing begins. The player who has won the privilege must lead a card of the

suit he has made trumps, and the game proceeds as in All Fours. The player who pitches the trump, whether it be the highest bidder or the seller, scores, if successful in playing, all the points he may make; but if he fail to make as many points as the highest bid, that number of points is deducted from his score and he cannot count any of the points made in that hand. If no bid is made the seller must pitch the trump.

The scoring is usually done by giving each player ten to begin with, subtracting what he wins, and adding what he loses, so that the winner is he who first gets rid of all his points. The score can be very readily kept by writing two X's, each of which stands for five. For the first point the middle of one X can have a ring drawn around it, and one of the arms can be crossed off for each point made afterward.

Pedro Sancho, or Sancho Pedro. A kind of Auction Pitch in which the dealer sells the privilege of making or pitching the trump, and the players may bid over and over again in turn, till all are satisfied. Any number of persons may play, but six or eight is the most convenient number and makes the best game. The cards are dealt as in All Fours, but nine or twelve cards instead of six may be dealt to each player, by agreement, if the number be small. High, Low, and Jack count each one point, as in All Fours, but Low counts for him who takes it, not for the original holder. Game, too, counts one point, but is won by the player who takes the ten of trumps. The five of trumps (called Pedro) counts five points, and the nine of trumps (called Sancho) nine points, each in favor of the player who wins the trick containing it. The game is usually for fifty points, and is scored as in Auction Pitch. The points must be scored in the order High, Low, Jack, Game, Pedro, Sancho.

Dom Pedro. When a Joker, or blank card, is used in this game, it is

called Dom, and the game Dom Pedro. No matter what suit is trumps, the Joker is always a trump, though it may be taken by any other trump; but, though the lowest trump, it cannot score for Low. It is scored last in order, or below Sancho, and counts the one who wins it fifteen points. When the game is played with a Joker, it is for 100 points.

Sancho may be omitted from the game, which is then called Pedro.

California Jack. A kind of All Fours played usually by two or four persons. After the deal, the dealer turns the rest of the pack (called the stock) face upward, and the exposed card is the trump. He then either slips the trump into the middle of the pack, or shuffles the cards after which they remain face upward on the table. After each trick is taken, the dealer gives the top card of the stock to the winner, and one card to each of the other players in order, to the left, holding each card face upward. Thus each continues to have six cards in his hand as long as the stock lasts. The points are High, Low, Jack, and Game, as in All Fours. As all the pack is used, High will always be the Ace, and Low the two of trumps. The latter counts for the taker, not the original holder as in All Fours. He who first makes ten points wins.

The chief feature of this game is the fact that the topmost card of the stock is always visible, and if it is a high one each player wishes to take the trick, so as to get it. Hence there is some interest in playing each trick, whereas in all other kinds of All Fours a player cares to take only tricks containing cards that count. Care must be taken not to expose any but the top card of the stock.

ALLITERATION. A game played by any number of persons, each of whom is required to write a story in which each word shall begin with a given letter of the alphabet. The stories may be required to be of the

same length, as agreed on beforehand, or a given time may be allowed for writing. When all have finished, the stories are read aloud, and he whose story is the best, as decided by a majority of the players, is declared the winner.

ALPHABETICAL TRAVELS. A game played by any number of persons. Each of the players, who sit in a row, tells, in order, to what place he will travel and what he will do there, always using for principal words (such as nouns, adjectives, and verbs), those beginning with a single letter of the alphabet. The first player takes A, the second B, and so on. Thus the players, in order, may say:

"I am going to Africa, to Ask an Arab for Apricots."

"I am going to Boston to Buy Baked Beans."

"I am going to California to Cut Curious Capers."

"I am going to Damascus to Dine on Delicious Doughnuts."

"I am going to Elizabeth to Eat Eggs Egotistically." And so on through the alphabet.

Any one unable to give a sentence of this kind may be required to pay a forfeit, or a score may be kept, the successful ones being given one point. In this case the company may be divided into sides. The method of playing must be agreed upon beforehand.

ALUM, Experiment with. Heat a small quantity of crystalline alum in an earthenware crucible. It will turn to a white powder, and expanding will overflow the crucible. (See also CRYSTALLIZATION.)

AMALGAMS. Compound of mercury with other metals. Mercury dissolves most metals at ordinary temperatures, as may be seen by experiment. The amalgam is often made more quickly if the metal be in the form of scrapings or powder, and if both it and the mercury be heated. Three curious kinds of amalgam are formed in the following experiments:

1. *Sodium Amalgam.* Into mercury contained in a glass dish put some thin strips of sodium and stir with a glass tube. The metals will unite with a crackling noise and a flame. As drops of metal are frequently thrown out it is best to cover the dish while the action is going on. The appearance of the amalgam varies according to the proportion of sodium used. Thirty parts of mercury to one of sodium form a solid mass. If three or four times as much mercury is used the result is a thick liquid, and with quantities between these two extremes the amalgam is a more or less thick paste.

2. *Ammonium Amalgam.* Half fill a test tube with a strong solution of sal-ammoniac in water and pour into it a small quantity of sodium amalgam. The liquid will expand and push itself out of the tube in a pasty, frothy mass. This has been supposed by some persons to be an amalgam of mercury and the metal ammonium, which is believed to be present in ammonia. It breaks up soon into mercury and ammonia.

3. *Gold Amalgam.* Suspend a piece of gold leaf in a bottle containing mercury. The mercury vapor will amalgamate with the gold, turning it gradually gray. (The use of mercury for extracting gold from its ore is described in C. C. T., article GOLD).

AMMONIA, Experiments with. (Read article on CHEMICAL EXPERIMENTS). Ammonia is described in C. C. T. The common ammonia water sold at drug stores is ammonia gas mixed with water. The gas can be obtained from this, by heating it in a flask, the delivery tube from which passes to the top of an inverted jar, since the gas is lighter than air. A piece of red litmus paper, held at the mouth of the jar when it is full, will turn blue (see TEST PAPERS). The gas cannot be collected over water because it dissolves in water so easily.

Another way to obtain the gas is

to mix a teaspoonful of pulverized sal-ammoniac with twice as much freshly slaked LIME, first allowing the lime to cool. Add just enough water to make the mixture lumpy when stirred. Heat it gently in a flask, collecting the gas as before. The ammonia in this case comes from the sal-ammoniac, which is composed of chlorine and ammonia. The chlorine prefers the lime to the ammonia, and so lets the latter escape.

EXPERIMENTS.

1. *The Ammonia Fountain.* Fill a bottle with ammonia gas as described above, and stop it with a cork through which passes a small glass tube, ending in a jet inside the bottle. Dip the exposed end of the tube into a glass of water, and after a time the water will spurt up into the bottle of ammonia, forming a little fountain. The reason is that water and ammonia have a great liking for each other. The gas in the tube dissolves in the water into which it projects, and the pressure of the air on the surface of the water in the

Ammonia
Fountain.

glass forces it up to take the place of the dissolved ammonia. Thus more gas is dissolved, and so the fountain keeps on playing till all the gas is gone. It often takes a long time to start the fountain, because the tube is filled with air, and the action does not begin till the ammonia reaches water. The experimenter will have to wait patiently, or he may hurry matters by pouring a little water into the tube. If the water in the glass be colored with red litmus, it will turn blue as it enters the ammonia (see TEST PAPERS). The experiment will succeed better if the

ammonia be perfectly dry, so it may be passed through a drying bottle before collecting. See that the cork and tube are perfectly tight, or the fountain will not play.

2. *To Burn Ammonia.* To burn a jet of ammonia gas it must be surrounded by OXYGEN. Connect the delivery tube *d* from the drying



Argand
Burner.

bottle to a long glass jet around which is placed an argand lamp chimney, as shown in the figure, the top of the chimney *a* being on a level with the top of the jet. It will be found impossible to light the ammonia gas flowing from the jet unless a current of oxygen be passed through the lamp chimney from a tube *d*, when it will take fire with a

yellow flame. Instead of surrounding the ammonia with oxygen, the two gases may be mixed, by passing a stream of oxygen through strong ammonia water in a flask or bottle. Heat the flask, and the mixed gases can then be lighted at its mouth.

3. *Sal-ammoniac.* Into the bottom of a glass pour a few drops of strong ammonia water, and shake it about so that it will wet the sides of

on it, bottom upward. After waiting a moment, pull the paper away, when the glass will fill with a dense, white cloud. This cloud is formed of particles of sal-ammoniac, which is made of chlorine and ammonia.

4. *Ammonia from Cheese.* Ammonia may be obtained from cheese in the following manner. Place in a test tube a bit of cheese and some caustic potash, and heat over an alcohol lamp. The odor of ammonia will soon be perceived, and if a piece of turmeric paper be held over the tube it will be turned brown, showing that an alkali is present. The ammonia is formed by the union of the nitrogen and hydrogen which are present in cheese.

ANAGRAMS. A game played with printed letters of the alphabet, like those used in playing LOGOMACHY. Each player forms a word and then, mixing the letters composing it, gives it to his right-hand neighbor, who is required to arrange the letters again in their proper order. This is the usual method, but as thus played Anagrams is rather an amusement than a game. It may be played as a game by requiring each player to give his word, at the same time, to each of the others. Whoever guesses all his words soonest, or guesses most of them in a given time, is declared winner. In this method no two persons have exactly the same list of words to solve. That all may be equal in this respect, some one not in the game may give the words to all.

Forming Anagrams has long been a favorite amusement, and much ingenuity has been shown in transforming a word, by changing its letters into another defining it or related to it in some way. Some of the anagrams made in this way are as follows:

Telegraph.—Great help.

Reformations.—To sin far more.

Old England.—Golden land.

The following was made by Dean Swift:

Sal-ammoniac Cloud.

the glass. Into another glass pour, in like manner, HYDROCHLORIC ACID; place a sheet of paper over one glass and then put the other

Transubstantiation.—Sin sat on a tin tar tub.

The game of Anagrams is called in France *Le jeu de mots* (the Game of Words), and is played with bits of wood or bone resembling DOMINOES, having a capital letter on one end and a small one on the other.

Alphabet Game. A kind of Anagrams, where, instead of the actual letters of the word to be guessed, the guesser is given an arrangement of dots, single ones representing consonants, and double ones vowels. Thus, the word "Philadelphia" would be denoted thus:

. : :

The guesser is allowed to ask "Is it a city?" "Is it a person?" or any similar question which can be answered by "Yes" or "No." The number of these questions can be limited by agreement. This game is called in Germany *Das Buchstabspiel* (the Letter Game).

ANAMORPHOSES. Drawings in which the objects represented are twisted out of shape, but can be seen in their proper proportions by using some special device. The simplest kind can be made as follows. Suppose Fig. 1 is the picture to be transformed. Divide it into squares, as shown. Then draw a straight line ab (Fig. 2) equal to the side AB of the square, divide it into the same num-

Fig. 1.

ber of parts, and draw lines from each point of division to some point below

as V . Draw VS parallel with the base line, and from any point S on



Fig. 2.

it draw a line to the point a . At the places where this crosses the other lines draw parallels to the base line. The figure $acdb$ will now be divided into the same number of parts as the original square, but of a different shape. The picture is now re-drawn in this new figure, placing in each part what was in the corresponding square. The greater the number of squares into which the original picture was divided, the more accurately this can be done. By looking at the distorted picture from a point near the paper just above V , it will appear in its right shape. This point varies according to the positions of the points V and S , but is easily found by trial.

Another way of drawing the same

kind of anamorphosis is to prick pin-holes in the original picture so as to trace the outlines, and then hold it upright just in front of a candle so

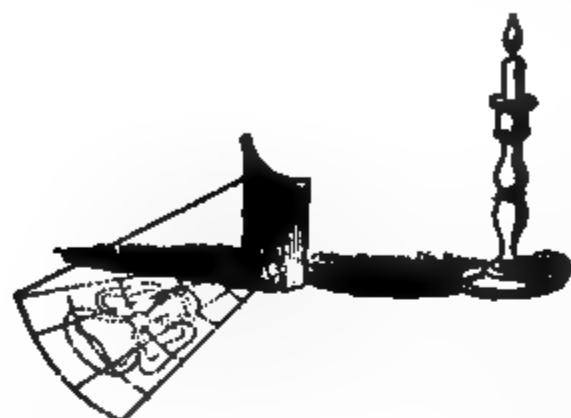


Fig. 3.

that the light shining through the pin-holes forms the picture on a sheet of paper laid before it on the table. The outlines are then traced on this

sheet by following the illuminated lines with a pencil, and the picture is afterward filled in in detail. If the original picture be removed and the distorted one looked at with the eye placed exactly where the candle was, it will be seen in its proper shape. (See Fig. 3.)

Anamorphoses are sometimes made, which appear of their proper shape when viewed in a cylindrical or conical mirror. Such distorted pictures can often be bought at toy stores, but they are very difficult to draw properly.

ANGLING, or FISH POND. A game played by an even number of persons, who angle for toy fish with a miniature pole and hook and line. The fish, which may be made to look like real fish, or may be simply little pieces of wood, are fitted with rings

Angling.

about 1-16 of an inch in diameter, and have on them numbers in regular order. For four players, about



"Fish."

forty fish are generally provided. The players sit opposite each other, and each is given five fish for his

"private pond," which are placed in front of him, while the rest are put in the middle of the table to form the "large pond."

The game begins by two of the players fishing in each other's ponds, each holding his pole, and trying to lift one of the fish by passing the hook through the ring. The first one to do so cries, "Caught!" and his opponent takes the fish in his hand, while the successful angler

guesses whether its number is odd or even. If the guess be correct he takes the fish into his own pond, and the same pair fish again as before, but in the large pond. As long as one of them is successful, the same pair continue to fish, alternately in each other's ponds and the large pond. When there is a wrong guess, the fish is put into the large pond, if it has been taken from a private pond, and into the opponent's pond if from the large pond, and the next two players begin to fish. If the players catch fish at the same time, the one who first calls out "Caught," is given the preference. If both call at once, he who guesses correctly is preferred, and if both guess correctly, the fish are returned to their respective ponds for another trial. The game is ended when any pond, large or private, is empty, and he wins who has most fish. If two have the same number, the sum of the numbers marked on the fish decides the game. When only two play, each private pond should contain ten fish.

Angling is much played as a PROGRESSIVE GAME. When it is thus played, an increased number of fish is needed; each player may be provided with a rod and line, or there may be two for each table.

ANIMAL, VEGETABLE, AND MINERAL. See TWENTY QUESTIONS.

ANORTHOSCOPE. An optical toy which distorts figures viewed through it. It consists of two discs, on one of which the figure to be viewed is painted, while in the other there are slits through which the observer looks, as in the ZOETROPE. The discs are so arranged as to revolve in opposite directions, and the disc bearing the figures is made transparent, so that it may be seen by holding it up toward the light. The figures are usually so drawn that when viewed by the unaided eye they are unrecognizable, but when placed in the anorthoscope they are restored to their proper shape. The

arrangement and results of the toy depend somewhat on the relative velocity of the disks. We will suppose that the disk bearing the slit is made to revolve once, while that with the figure does so four times. Then there must be four slits in the front disk, arranged thus $\cdot\cdot\cdot\cdot$, and, whatever figure may be drawn on the other disk, five distorted figures, all alike, will be seen by looking through the slits. The illustrations on page 14 show the appearance of two designs, first as seen with the naked eye, and then through the slits.

The reason why the toy produces this effect will now be given. First suppose there is only one slit in the front disk, and only a dot, instead of a picture, on the other. Suppose the disk to start with the dot just behind the slit. As the back disk turns four times as fast as the front one, the dot will pass behind the slit four times before they get around into the same position again. Thus the eye will see five dots on the rear disk instead of one. If there are four slits at right angles the result will be the same, for each will pass the dot in the same place as the others. But there cannot be more than four. The same will be true of a large figure as of a dot, but each of the multiplied figures will be shut together like a fan, so as to extend only one-fifth as far around the circle as before. That is, supposing the circle to be divided into 360 degrees, if the picture extended around sixty degrees, it will appear in the anorthoscope to extend over only twelve degrees. This shutting together is a consequence of the rapid movement of the rear disk past the front one. If this reduction in size took place in all directions, the figure would be the same shape, only smaller, but it takes place in only one direction, that is, *around* the circle, hence the figure is twisted out of shape.

Any figure may be drawn on the disk so that it will appear in its proper shape when viewed through the an-

orthoscope. Suppose the figure to be that of a card as shown in the illustration. Draw lines from the center of the disk through the angles of the card, and others to the points 1, 2, 3, etc., at intervals of any desired number of degrees, say five, as

in the plan on page 15. The position of the card should be so arranged that the lines passing through the corners will be multiples of five degrees apart. (The degrees may be laid off with a curved scale, called a protractor, sold by any dealer



Anorthoscope Designs.

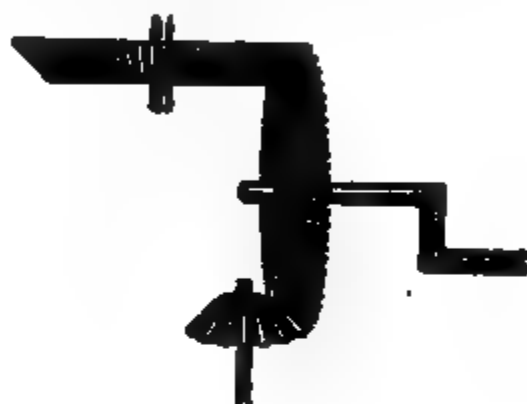
in drawing materials.) Then draw an equal number of lines from the center, twenty-five degrees apart to the points 1', 2', 3', 4', etc., representing the first lines opened out like a fan. Take any line of the figure, and measure the distance, from the center, of the point where it crossed each of the radii first drawn, and make a dot on the corresponding new radius at just that distance. For instance, measure the distance from the center to the left-hand corner on the radius drawn to 1, and then lay it off on the radius drawn to 1'. Join all the dots so made by a curved line, and do the same with all the other lines of the figure. Care must

be taken that the original figure does not take up more than one-fifth of the disk; otherwise the adjoining figures, as seen in the anorthoscope, will overlap.

Anorthoscopes can be made which will multiply the figure seen as many times as desired, shutting it together to a corresponding degree. The number of figures seen is always one greater than the number of revolutions the back disk makes while the front one is going around once, and the number of slits, always one less than the number of figures, must be disposed at equal distances around the disk. Thus, if it makes eight to the front disk's one, nine figures will be seen, each of which reaches only one-ninth as far around the circle as the original. In this case there must be eight slits.

The anorthoscope may be made to work in many other ways besides the one described here. If the disks revolve in the same direction the number of revolutions can be so adjusted as to combine several figures into

but it is more difficult to make the disks revolve at exactly the proper rate. This can be effected by means of cog-wheels arranged as shown in the illustration. If the number of cogs on the larger of the two parallel wheels be four times that on the smaller, the latter will revolve four



Wheels for Anorthoscope.

times as fast. The number on the crank-wheel is immaterial. The arrangement can be made at any machine shop.

The anorthoscope is the invention of Prof. Plateau, a Belgian scientist. The name is from the Greek *anorthos*, crooked, and *skopein*, to see.

ARCHERY. The best bows are made of a single piece of Italian or Spanish yew, or of two pieces joined at the handle, but good bows are made also of lancewood or ash. A good bow is largest in the middle and tapers toward the ends, which are usually tipped with horn with notches to hold the cord. The force required to draw a 28-inch arrow to its head in any bow measures that bow's strength, which is expressed in pounds. The distance to the head of such an arrow is 27 inches, so if a 40-pound weight, tied to the middle of a bow string, will pull it just 27 inches below the bow (held horizontally), the latter is a 40-pound bow. The best arrows are made of red deal wood with a piece of harder wood fastened to them at the point or "pile." At the opposite end three strips of feather are glued, to make

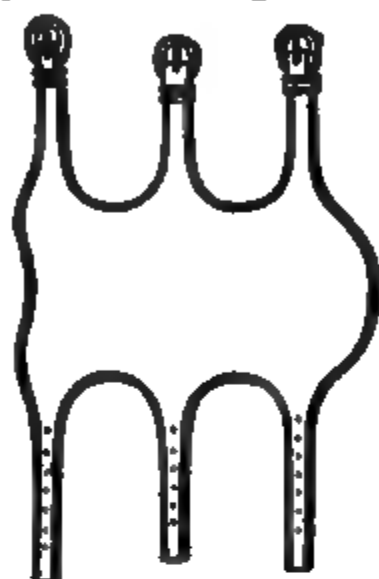
Plan for Drawing.

one, instead of expanding one into several. By slightly varying these figures an effect is obtained like that of the ZOETROPE.

The anorthoscope is not commonly sold at toy stores. The disks can easily be made as above described,

the arrow fly accurately. Sometimes the feathers are cut in triangular shape and sometimes they are curved. The latter method, called balloon feathering, is generally con-

sidered the best, though perhaps not the easiest. The best arrows are made in England, and their weight is expressed in English shillings and pence. The regulation length is 28



Bracer and Glove.

inches for six-foot bows, and 25 for women's bows, which are from four and a half to five feet long.

Thimbles of leather (called "finger stalls"), open at the end, are usually worn on the forefinger, middle-finger,

guard the fingers. Other forms of protection for the fingers may be substituted. Many archers wear also a "bracer," or arm guard of hard leather, fastened by straps to the left arm near the wrist, to protect it from the bow-string. A leather or tin case called a quiver may be fastened to the archer's belt to hold his arrows, and a tassel of worsted is appended to wipe the dirt from them. The targets used in archery matches are made of a pad of straw covered on one side with cloth, and hung on a tripod so that its middle is about four feet from the ground. In the center is a gilt or yellow spot, called the gold (or sometimes the "bull's eye"), and around this in order are bands of red, blue, black, and white. The archer scores a larger or smaller number as he strikes one or another of the colors. Thus:

Target.

An arrow in the gold generally counts 9					
" " " " red	"	"	"	"	7
" " " " blue	"	"	"	"	5
" " " " black	"	"	"	"	3
" " " " white	"	"	"	"	1

and third finger of the right hand, so that the finger tips may not be blistered by the bow-string. They should fit closely and should be of as thin material as will properly

The score is sometimes kept by pricking the shots on a card shaped like a target, as shown in the illustration on page 17.

The targets most used in England were formerly supported on Butts,—walls of sodded earth serving as backing for discs of paper. Butts should be 6 feet high and 8 feet long. Instead of the backing of straw sold at toy stores, a box filled with earth may be used. Another simple kind of target is a "clout," or disc of pasteboard, stuck in the cleft end of a stick, the other end of which is pushed into the ground.

An archer's equipments are often kept in a cupboard called an Ascham, after Roger Ascham, a writer on archery. It is shaped like a small wardrobe, about six feet high and three wide. About three feet from

the bottom is a shelf with holes in it, in which are supported the bows and arrows, while hooks on the sides bear the bracer, gloves, and other necessary articles.

Roving.—Instead of firing from the same point, archers sometimes move about and shoot at improvised targets, which is called "roving." One of the party of archers selects a tree, or other object, to be shot at, and he who hits it is allowed to choose the next one. If no one hits it, he whose arrow falls nearest is allowed the choice.

Hunting.—Expert archers say that hunting with a bow and arrow is a more fascinating sport than

Score Card.

hunting with a gun. The shooting makes no noise, and so does not frighten the game. Shooting at wild game requires more skill than shooting at an ordinary target. Good practice for shooting at birds may be obtained by using a black rubber ball, about four inches in diameter, suspended by a string from the limb of a tree.

The rules governing archery matches or "meetings" are given below.

The first thing for the beginner in archery is to learn to "string" his bow properly; that is, to fit the bow-string to it so that it will be ready for use.

When unstrung the bow is nearly straight. The bow-string has a loop at each end like that in the illustration. Slipping the larger loop over one end of the bow held uppermost, and sliding it down below the "nock" or groove for the string, the archer fits the smaller one into the lower nock, and then taking the middle of the bow in his right hand presses the lower end of the bow on the ground in the hollow of his right foot, the back of the bow next to the foot, as shown in the illustration. By then pulling with the right hand and pushing with the left, near the upper end of the bow, it will be bent, and

at the same time the left hand can push the upper loop into its nock.



Bow-string Loop.

The bow-string should be two or three inches shorter than the bow. In a strung bow the string should be about six inches from the wood at the middle in a six-foot bow, and correspondingly nearer in a smaller one. When the bow has been strung the archer holds it upright by its middle in his left hand, and taking an arrow in his right, fits its notch to the middle of the bow-string, the shaft being on the left side of the bow and resting on the left hand. He then hooks the first three fingers of his right hand around the string, so that it rests on the finger-balls, the end of the arrow being between the first and second; and extending the left arm, pulls the string with the right, at the same time drawing the arrow with it till its head nearly touches the bow. Then both string and arrow are released, by unhooking the fingers gently, and the shot is made. The best posture for the archer, while shooting, is with the left side toward

the target, the body nearly erect, and the feet about six inches apart. The best archers hold the bow upright while shooting, but lean the top a little to the right, which keeps the arrow in place and enables the string to be drawn more easily.

Accuracy in shooting depends chiefly on three things: the draw, the aim, and the release. It requires long practice to draw the arrow and string back steadily, and if this is not done, a good shot cannot be made. The arrow should be drawn back to a point just under the chin, and not to the eye, which the beginner may think is necessary for a correct aim. It is of no use to "sight" along the arrow, for it does not fly straight to the mark, but describes a curve in the air. If the arrow is pointed directly at the target, except at very short distances, it will strike the ground in front of the mark. This is equally true of a firearm; the bullet moves in a curve, not a straight line, but it moves very fast, and so, except for very long distances, the

Stringing.

curve is very flat, and the gun or pistol can be aimed at the mark.

But the arrow moves much more slowly, and sixty yards away from the target it must be pointed above the target. The point which the arrow-head must seem to cover at any particular distance is called the "point of aim" for that distance, and is best learned by trial. The string should always be drawn back to the same spot before taking aim, otherwise the arrow-head would seem to the eye to cover different points. The best plan is to draw the arrow back three-fourths of its length, then pause an instant to take aim, and then draw it the rest of the way and loose

Shooting.

it. The release, or loosing the arrow, requires great care, as it is easy, in letting go, to move the arrow to one side, thereby destroying the aim. The fingers should slip easily from the string, and should not follow it. One who hopes to become a good archer should practice the draw, the aim, and the release, till he has perfect command of them, and should always perform them in the same way, never changing to try experiments.

At archery club meetings, the con-

testants generally take turns, each shooting three arrows at a turn, until each has shot a number previously agreed upon. This entire number is called a "round." The rounds generally shot are:

The "York Round," consisting of—
 72 arrows at 100 yards.
 48 " " 80 "
 24 " " 60 "
 —
 144 arrows.

The "American Round," consisting of—
 30 arrows at 60 yards.
 30 " " 50 "
 30 " " 40 "
 —
 90 arrows.

The "Columbia Round" (for women), consisting of—
 24 arrows at 50 yards.
 24 " " 40 "
 24 " " 30 "
 —
 72 arrows.

Where a large number are to shoot, several targets are used, and the contestants are divided into parties, each of which uses the same target throughout the match.

RULES FOR ARCHERY MEETINGS.

1. A Field Captain shall be appointed who shall have entire control of the ranges, targets and order of shooting, and he shall appoint a Target Captain for each target, who shall direct the order of shooting at his target.

2. Each Target Captain shall appoint a Scorer and a Herald to act at his target. The Scorer shall keep a record of each arrow shot, upon blanks provided for the purpose by the association. The Herald shall announce the result of each shot.

3. An arrow must remain in the target until the value of the "hit" is recorded, otherwise the "hit" shall not be counted.

4. The targets shall be four feet in diameter, and placed on easels, the center of the "gold" being four feet from the ground.

5. The "gold" shall be $9\frac{1}{8}$ in diameter, and each ring shall be $4\frac{1}{8}$ inches in width.

6. The value of colors shall be:

Gold, 9; red, 7; blue, 5; black, 3; white, 1.

7. In case an arrow cuts two colors, it shall count as having hit the inner one.

8. All disputes shall be referred for decision to the Captain of the target where they arise.

9. Every archer shall shoot with arrows bearing his mark, and every arrow leaving the bow shall be deemed as having been shot, unless the archer can reach it with his bow while standing inside the line from which he is shooting.

10. No person, unless competing for prizes, shall be allowed within the bounds of the Archers' grounds during the progress of the shooting.

Cross-Bow.—The ancient cross-bow is described below, under History. The modern toy is a bow fixed on a gun-stock, and fired by a trigger like that in the illustration. The bow-string, when drawn, is hooked over the trigger and the arrow is placed in a groove. The trigger, which turns on a pivot, is held at the bottom by an elastic band, which keeps it in position.

Cross-bow.

The arrows shot by a cross-bow are properly called bolts, and are shorter than those shot from a long-bow. Pieces of wood three or four inches long, loaded at the head by driving in a nail, make good bolts.

A small cross-bow, often called a watch-spring gun, can be made by using a piece of watch-spring for a bow. The spring should be about six inches long. Little arrows, or shot, may be used in such a gun, which

will carry about 50 feet. In firing shot, fit the gun with a tin barrel made of a blow-gun tube. A stick fitting loosely in it has the bow-string passed through a hole in its rear end. The spring may also be arranged as shown in the illustration on page 21. The stick must be so long that when the bow is bent the end does not pull out of the tube.

Elastic Cross-bow.—This bow is made of a stiff piece of wood, as it is not intended to bend. Its convex side is toward the shooter. The string is made of strong india-rubber cord whose elasticity sends the arrow or bolt.

History.—The bow and arrow were in use all over the world in times so ancient that we have no record of them. This is proved from arrow-heads dug up in many places; and from other things found with them we know that they were made long before men were acquainted with the use of metals, in the Stone Age, so called because all weapons and tools were then made of stone. These ancient arrow-heads, sometimes six inches in length by two in breadth, were used both in war and in hunting enormous wild animals now extinct. The earliest records we have tell of skilled archers among the Asiatic nations and the Egyptians; and the first explorers of the American continent found the natives expert in the use of the bow. Among the best archers of antiquity were the Persians, Parthians, Numidians, and Cretans. The archers in the Persian army were so numerous and let fly such clouds of arrows that a Persian once boasted to a Greek that they would darken the sun at mid-day. The Greeks and Romans employed foreign archers. The poet Virgil describes an archery match where a bird tied to a mast was the target. One marksman cut the string with his arrow, and as the bird flew away another killed it.

Archery was practiced in England from the earliest times, but the Sax-

ons and Danes used the bow probably only for hunting. The illustration from an old manuscript shows an ancient Saxon bow and arrow. The Normans, however, made it a military weapon, and their archers won the battle of Hastings, which brought England under Norman rule. From this time the English long-bowmen

became the most famous in the world, and did much toward making their country great and powerful. The kings of England were so anxious that skill in archery should not decline, that they frequently discouraged and even forbade other amusements and exercises. The price of bows was regulated by law. In the



Watch-spring Gun.

reign of Edward IV. dealers were compelled to sell them at three shillings and fourpence each (about 83 cents), but in Queen Mary's time the price was fixed at six shillings and eightpence (\$1.56) for the best bows, and two shillings (50 cents) for an inferior kind.

Roger Ascham, an Englishman, who wrote, in 1544, a book on archery called "Toxophilus" (the bow-lover), gives directions for shooting which are much the same as those approved by good archers to-day. He says that the ancient style of drawing the bow was to the right



Egyptian Archer.

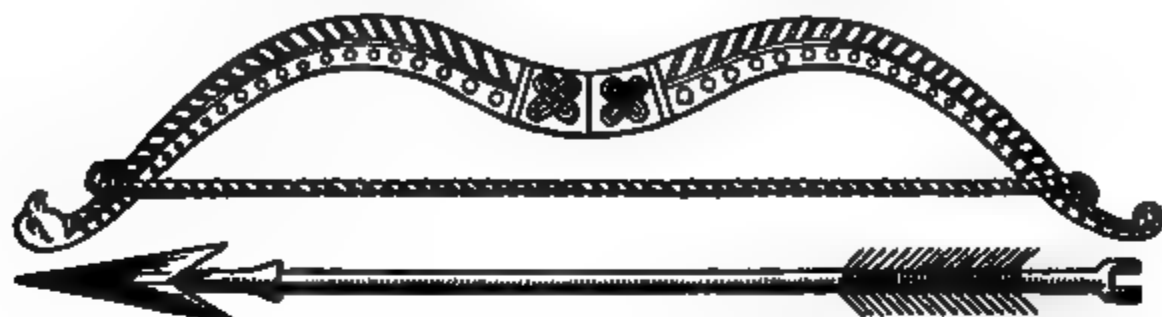
breast, but he prefers that it be drawn to the ear, the method of the English archers. He advises young archers to shoot at lights in the night, that they may learn to look at the mark in aiming, and not at the arrow.

Ancient archers were skilled in shooting long distances. By an act

of Parliament passed in the reign of Henry VIII., persons who had reached the age of twenty-four years were forbidden to shoot at any mark less than 220 yards' distance. But the statement, often made, that a good archer could hit a peeled willow wand at 300 yards, is believed by expert modern archers to be an

absurdity. Prince Arthur, son of Henry VII., was a fine shot with the bow, and from him good marksmen were frequently called Arthur. Henry VIII., while attending an archery

meeting, was so pleased with the shooting of a Londoner named Barlow, who lived at Shoreditch, that he gave him in jest the title of "Duke of Shoreditch," and the captain of



Saxon Bow and Arrow.

the London archers was long known by this name. In 1583, at a grand shooting match, the "Duke," with a retinue of mock marquises and earls, and a throng of about 7000 followers, all quaintly dressed, paraded in London.

The cross-bow or arbalast, which came into use about the 11th century, was more in vogue on the continent of Europe than the long-bow; but in England the archers disliked the new weapon, because it took less skill, and laws were passed against it. It consisted of a short bow fixed at the end of a stock somewhat like a gun-stock, on the top of which was a barrel slit so as to let the string be pulled back until caught by the trigger. When the trigger was pulled, the string was released and springing through the slit drove the arrow out of the barrel.

The best arbalasts had steel bows, and required the aid of a crank to draw them. They shot short arrows, called bolts or quarrels, so swiftly and with such force that they often pierced heavy armor. The cross-bow was the most deadly weapon in the world before the invention of fire-arms. The use of the bow survived long after that event, but when the improvement of musketry caused the bow to be given up as a weapon, archery became merely an amusement and remains so at the present

day. In 1844 there was a great revival of the sport in England, and there are now in that country more than eighty large clubs, some of

Arbalast.

which are centuries old. In the United States scientific archery has only recently come into favor, though the bow has always been used as a

toy. In 1879 was formed a National Archery Association, which holds meetings every year and awards gold medals as prizes.

ARMY SOLITAIRE. A SOLITAIRE game of CARDS, played with one full pack. The first card taken from the pack, whatever it may be, and the similar cards of the other suits are called foundation cards. These cards whenever they appear are placed to form the corners of a square of nine cards,

places being reserved for them till they appear. From these foundations, "towers," one of each suit, must be built up by placing on each in order the other cards of the same suit up to the King. If the foundation card is an Ace, the tower will thus include all the cards, but otherwise not. Other cards than the foundations are placed to form the five remaining cards of the square, till all the places are occupied. After that, a card may be placed on any of them

Shooting at the Butts with the Cross-Bow.

which ranks just above or just below it, without regarding suit. If a card, which will go on neither the towers nor in the "reserve corps," as the other piles are called, is turned, it must be laid aside to form "stock." The top card of any pile of the reserve corps may be placed on any other pile, either a tower or another reserve pile, if it belongs there. Thus, a Ten on a reserve pile may be put on a Nine of the same suit on a tower; or on a Nine or Knave of any suit on another reserve pile, and

when any pile of the latter is entirely used, the top card of the stock is taken to fill the vacant space. When all the cards are used, the stock is shuffled and played. This is usually done only once, but sometimes the player continues to do so till he completes his towers, measuring his skill by the number of shufflings of the stock. Skill is required in arranging the reserve corps so that it will best aid the building of the towers. The game is often more difficult with a small tower to build (as when a Nine

or Ten is the foundation) than with a higher one, for the useless cards clog the reserve corps. Sometimes, instead of stopping at the King, the towers are built higher, going on with the Ace, Two, Three, etc., till the whole suit is used, ending with the card just below the foundation card. Sometimes the reserve piles are built only downward instead of in either direction. This game of Solitaire is said to have been much played by the soldiers during our Civil War.

ARTIFICIAL WOOD. A solution of copper in strong ammonia has the property of dissolving woody fibre. To make it, half fill a quart bottle with ammonia and put into it a bunch of straight copper wires, of such a length that about half will be above the water. They should be allowed to stand thus several months, the bottle being shaken occasionally and the cork removed for a few minutes once in a while to admit more air, which is necessary to the formation of the solution.

Cut old newspapers into disks about an inch in diameter, and clip the disks on the edges so that they can be readily molded to a curved surface. They may now be partially dissolved in the solution, and will then adhere closely to form a solid mass, like wood.

The disks are best put in shape over a mold. For instance, if a thin glass flask be used, they can be molded over its surface, and then the flask can be broken by a sudden blow, leaving a wooden bottle when the fragments are removed. The solution should be poured, a little at a time, into a flat dish, and frequently renewed. The disks are soaked in it for a few minutes, till they feel slippery, and then molded over the bottle. Rubber finger-tips may be used to prevent injury to the fingers from the strong ammonia. After one layer has been applied, another is put on, till the desired thickness is obtained. In the same way, after a

little practice, other articles may be made. The paper disks are not simply stuck together, like paste-board, but form a solid wooden mass, and may be soaked in boiling water without coming apart.

ATHLETIC GAMES, properly speaking, include all manly sports requiring physical strength, such as BASE BALL, FOOT BALL, FENCING, and the like, but in the ordinary use of the term it means only those in which each man contends for himself alone. The sports in which several work together as a "team" are treated under their own titles. In this article are described only those feats included in the championship contests of athletic societies, together with a few additional ones sometimes seen at collegiate and other contests. The games usually found on the programmes of the Amateur Athletic Union, the chief athletic association in the United States (see p.38), are as follows:

100 yards dash, 220 yards dash, One-quarter mile run, One-half mile run, and the One mile run; also, Running five miles.

Hurdle racing, 120 yards with hurdles 3 ft. 6 in., 220 yards with hurdles 2 ft. 6 in.

Walking one mile, Walking three miles, Walking seven miles.

Running high jump, and the Broad jump.

Pole leaping, Putting the shot, Throwing the hammer, Throwing 56 lb. weight, Bicycle racing, Individual Tug of War, and Tug of War with teams of five men.

Each of these games is called an "event."

Rule I.—Officials.—Section 1. All amateur meetings shall be under the direction of: A Games Committee, One Referee, Two or more Inspectors, Three Judges at Finish, Three or more Field Judges, Three Time-keepers, One Judge of Walking, One Starter, One Clerk of the Course, One Scorer, One Marshal.

Sec. 2. If deemed necessary, as-

sistants may be provided for the Judge of Walking, the Clerk of the Course, the Scorer, and the Marshal, and an Official Announcer may be appointed.

Rule II.—The Games Committee. The Games Committee at any club meeting shall be composed of members of the Club holding the meeting.

This Committee shall have jurisdiction of all matter not assigned by these rules to the Referee or other games officials. (See also Rule XV).

Rule III.—The Referee shall decide all questions relating to the actual conduct of the meeting, whose final settlement is not otherwise covered by these rules.

He alone shall have the power to change the order of events as laid down in the official programme, to add to, or to alter the announced arrangement of heats in any event.

Rule IV.—The Inspectors. It shall be the duty of an Inspector to stand at such point as the Referee may designate; to watch the competition closely, and in case of a claim of foul to report to the Referee what he saw of the incident.

Such Inspectors are merely assistants to the Referee, to whom they shall report, and have no power to make any decisions.

Rule V.—The Judges at Finish shall determine the order of finishing of contestants, and shall arrange among themselves as to noting the winner, 2d, 3d, 4th, etc., as the case may require.

Their decision in this respect shall be without appeal, and in case of disagreement a majority shall govern.

Rule VI.—The Field Judges shall make an accurate measurement, and keep a tally of all trials of competitors in the high and broad jumps, the pole vault, the weight competitions, and the tug of war.

They shall act as judges of these events, and their decisions shall likewise be without appeal. In case of disagreement a majority shall govern.

In all weight competitions and jumps for distance, a small flag, placed in the ground, shall denote the best throw or jump as the contest progresses.

Rule VII.—The Timekeepers shall individually time all events where time record is called for. Should two of the three watches mark the same time and the third disagree, the time marked by the two watches shall be accepted. Should all three disagree, the time marked by the intermediate watch shall be accepted.

The *flash* of the pistol shall denote the actual time of starting.

In case only two watches are held on an event, and they fail to agree, the longest time of the two shall be accepted.

Rule VIII.—The Starter shall have sole jurisdiction over the competitors after the Clerk of the Course has properly placed them in their positions for the start.

The method of starting shall be by pistol report, except that in time handicap races the word "go" shall be used.

An actual start shall not be effected until the pistol has been *purposely* discharged after the competitors have been warned to get ready.

When any part of a competitor shall touch the ground in front of his mark before the starting signal is given, it shall be considered a false start.

Penalties for false starting shall be inflicted by the Starter, as follows:

In races up to and including 300 yards, the competitor shall be put back one yard for the first and another yard for the second attempt; in races over 300 yards and including 600 yards, two yards for the first and two more for the second attempt; in races over 600 yards and including 1000 yards, three yards for the first and three more for the second attempt; in races over 1000 yards and including one mile, five yards for the

first and five more for the second attempt ; in all races over one mile, ten yards for the first and ten more for the second attempt. In all cases the third false start shall prevent his competing in that event.

The Starter shall also rule out of that event any competitor who attempts to advance himself from his mark, as prescribed in the official programme, after he has given the warning to "get ready."

Rule IX.—The Clerk of the Course shall be provided with the names and the numbers of all entered competitors, and he shall notify them to appear at the starting line before the start in each event in which they are entered.

Rule X.—The Judge of Walking shall have sole power to determine the fairness or unfairness of walking, and his rulings thereon shall be final and without appeal.

He shall caution any competitor whenever walking unfairly ; the third caution to disqualify, except that he shall immediately disqualify any competitor when walking unfairly during the last 220 yards of a race.

He shall control his assistants, and assign to them such of his duties as he may deem proper.

Rule XI.—The Scorer shall record the order in which each competitor finishes his event, together with the time furnished him by the Timekeeper.

He shall keep a tally of the laps made by each competitor in races covering more than one lap, and shall announce by means of a bell, or otherwise, when the leading man enters the last lap.

He shall control his assistants, and assign to them such of his duties as he may deem best.

Rule XII.—The Marshal shall have full police charge of the enclosure, and shall prevent any but officials and actual competitors from entering or remaining therein.

He shall control his assistants, and assign them their duties.

Rule XIII.—The Official Announcer shall receive from the Scorer and Field Judges the result of each event, and announce the same by voice or by means of a bulletin board.

Rule XIV.—Competitors shall report to the Clerk of the Course immediately upon their arrival at the place of meeting, and shall be provided by that official with their proper numbers, which must be worn conspicuously by the competitors when competing, and without which they shall not be allowed to start.

Each competitor shall inform himself of the time of starting, and shall be promptly at the starting-point of each competition in which he is entered, and there report to the Clerk of the Course.

Under no condition shall the attendants be allowed to accompany competitors at the start or during any competition except in match races, where special agreements may be made.

Rule XV.—Protests against any entered competitor may be made verbally or in writing to the referee, or a member of the Games Committee, before or during the meeting. If possible the Committee shall decide such protest at once. If the nature of the protest or the necessity of obtaining testimony prevents an immediate decision, the competitor shall be allowed to compete under protest, and the protest shall be decided by the Games Committee within one week, unless its subject be the amateur standing of the competitor, in which case the Games Committee must report such protest within forty-eight hours to the Secretary of the A. A. U.

Rule XVI.—Track Measurement. All distances run or walked shall be measured upon a line eighteen inches outward from the inner edge of the track, except that in races on straightaway tracks the distance shall be measured in a direct line from the starting mark to the finishing line.

Rule XVII.—The Course. Each

competitor shall keep in his respective position from start to finish in all races on straightaway tracks, and in all races on tracks with one or more turns he shall not cross to the inner edge of the track, except when he is at least six feet in advance of his nearest competitor.

The Referee shall disqualify from that event any competitor who willfully pushes against, impedes, crosses the course of, or in any way interferes with another competitor.

The Referee shall disqualify from further participation in the games, any contestant competing to lose, to coach, or in any way impede the chances of another competitor either in a trial or final contest.

Rule XVIII.—The Finish of the course shall be represented by a line between two finishing posts, drawn across and at right angles to the sides of the track, and three feet above which line shall be placed a tape attached at either end to the finishing posts. A finish shall be counted when any part of the winner's body, except his hands or arms, shall touch the tape at the finish line. The tape is to be considered the finishing line for the winner, but the order of finishing across the track line shall determine the positions of the other competitors.

A description of each of the standard events, except the Bicycle race and the Tug of War, which are described separately, will now be given. A list of the best records in each is given in the Appendix.

Men who engage in athletic sports for a money prize or for a portion of the gate receipts are termed professional athletes, and are not allowed to compete in amateur contests. The National Amateur Athletic Union has adopted the following definition of an Amateur:

"One who has not entered in an open competition; or for either a stake, public or admission money or entrance fee; or under a fictitious name; or has not competed with or

against a professional for any prize or where admission fee is charged; or who has not instructed, pursued or assisted in the pursuit of athletic exercises as a means of livelihood, or for gain or any emolument; or whose membership of any Athletic Club of any kind was not brought about or does not continue, because of any mutual understanding, express or implied, whereby his becoming or continuing a member of such Club would be of any pecuniary benefit to him whatever, direct or indirect, and who shall in other and all respects conform to the rules and regulations of this organization, will be considered an Amateur."

An open competition is one in which any one who wishes may enter.

Walking.—It is very difficult to distinguish between walking and running, and on this account many so-called "walking matches" are made

Slow Stride.

what is called "go as you please" matches; that is, the contestant is allowed to walk, run, jump, or move in any way he chooses, so long as he receives no aid. To be what is

called a "fair" walker, the athlete must touch both heel and toe to the ground, first the former and then the

walker is fair or not has led to many disputes. A fast walk, following the rules, is not a graceful gait nor a natural one, and can be learned only by practice. The illustrations show two different kinds of strides.

Running. Running any distance from 100 to 400 yards is called "sprinting," while covering all distances of a mile or over is termed long-distance running. To make quick time, especially in sprinting, a good start is essential, and many methods of starting have been adopted by skilled runners. Some crouch down, placing the left foot forward, holding the right arm out, and the left parallel with the right leg; some stand with both heels together, jumping forward at the flash of the pistol, and others stand with one side in advance of the other. (Not allowable by U. A. A. rules.)

Free Stride.

latter, he must not bend the knee while his foot is on the ground, and he must never have both feet in the air at once. The difficulty experienced in justly deciding whether a

It has been found almost impossible to time a short run with perfect accuracy. The timing is done with a "stop watch" which is arranged with a long, fine pointer-hand, which moves completely around its dial once every minute, and with a small spring

Start of Foot Race.

at the side by pressure on which the watch can be started or stopped at any instant desired.

The timer starts his watch on seeing the flash of the pistol, and stops it when the man he is timing crosses

the mark. The time can then be read off. A pointer, however, cannot be made to travel uniformly. It goes by little jumps, and until recently the jumps were made every fifth of a second. The time, there-

fore, was doubtful by this amount, for when the watch was stopped it could not be told whether the hand had just finished a jump or was about to start on a new one. In a fifth of a second a good sprinter moves about two yards, and races are often won by a few feet.

Jumping. There are four kinds of jumps, the running high, the running broad (or long), the standing high, and the standing broad (or long).

The high jumps are made over a light bar supported on pegs inserted one inch apart in two upright posts. The pegs project on the side of the posts away from the jumpers, so that if the jumper strike the bar with his foot he will simply lift it from the pegs and not be thrown down. Sometimes in practice a cord, weighted at each end, is used instead of a bar, but this is not allowed in match contests.

At each succeeding round the bar is raised usually an inch, but sometimes more. In the standing broad jump the contestants are sometimes permitted to hold dumb-bells or weights in their hands, but in the ordinary broad jump this is not allowed. Where, however, this is done, the jumper casts the weights behind him while in mid-air and is thus carried forward a greater distance.

The rules of the National Amateur Athletic Union governing jumping are as follows:

Section 1. A fair jump shall be one that is made without the assistance of weights, diving, somersets, or hand springs of any kind.

In all handicap jumps the scratch man shall be entitled to try last.

Sec. 2. The Running High Jump. The Field Judges shall decide the height at which the jump shall commence, and shall regulate the succeeding elevations.

Each competitor shall be allowed three trial jumps at each height, and if on the third trial he shall fail, he shall be declared out of the competition.

Competitors shall jump in order as placed in the programme; then those failing, if any, shall have their second trial jump in a like order, after which those having failed twice shall make their third trial jump.

The jump shall be made over a bar resting on pins projecting not more than three inches from the uprights, and when this bar is removed

High Jump.

from its place it shall be counted as a trial jump.

Running under the bar in making an attempt to jump shall be counted as a "balk," and three successive "balks" shall be counted as a trial jump.

The distance of the run before the jump shall be unlimited.

A competitor may decline to jump at any height in his turn, and by so doing forfeits his right to again jump at the height declined.

Sec. 3. The Standing High Jump. The feet of the competitor may be placed in any position, but shall leave the ground only once in making an attempt to jump. When the feet are lifted from the ground twice, or two springs are made in making the attempt, it shall count as a trial jump without result.

With this exception the rules governing the Running High Jump shall govern the Standing High Jump.

Sec. 4. The Running Broad Jump. When jumped on earth, a joist five inches wide shall be sunk flush with it. The outer edge of this joist shall be called the scratch line, and the measurement of all jumps shall be made from it at right angles to the nearest break in the ground made by any part of the person of the competitor.

In front of the scratch line the ground shall be removed to the depth of three and the width of twelve inches outward.

A foul jump shall be one where the competitor in jumping off the

Jump. The feet of the competitor may be placed in any position, but shall leave the ground only once in making an attempt to jump. When the feet are lifted from the ground twice, or two springs are made in making the attempt, it shall count as a trial jump without result.

In all other respects the rule governing the Running Broad Jump shall also govern the Standing Broad Jump.

Sec. 7. The Three Standing Broad Jumps. The feet of the competitor shall leave the ground only once in making an attempt for each of the three jumps, and no stoppage between jumps shall be allowed. In all other respects the rules governing the Standing Broad Jump shall also govern the three Standing Broad Jumps.

Sec. 8. Running Hop, Step and Jump. The competitor shall first land upon the same foot with which he shall have taken off. The reverse foot shall be used for the second landing, and both feet shall be used for the third landing.

In all other respects the rules governing the Running Broad Jump shall also govern the Running Hop, Step and Jump.

(In the Running High Jump a line called a balk line is sometimes drawn three feet in front of the bar, and if the competitor passes this he is credited with a trial, whether he actually attempts to jump or not.)

In the running broad jumps, the space cleared depends partly on the way in which the spring is made, and partly on the impetus gained by the run. Before 1870 almost every championship contest was won with a jump of less than 20 feet, but now many a one who is a good sprinter can clear that distance. Some authorities think the reason for this is that jumpers now take longer and swifter runs than formerly, and that the impetus thus gained carries them a greater distance.

In both the high jumps, some

Long Jump.

scratch line makes a mark on the ground immediately in front of it, and shall count as a trial jump without result.

Each competitor shall have three trial jumps, and the best three shall each have three more trial jumps.

The competition shall be decided by the best of all the trial jumps of the competitors.

The distance of the run before the scratch line shall be unlimited.

Sec. 6. The Standing Broad

jumpers draw their legs up under them, straightening them forward as they pass the bar, and others swing them to one side as they clear it.

In running for a jump, the last few steps should be slightly shorter than the usual stride.

Hurdle Racing consists in a combination of running and jumping. These races are usually either 120 yards or 220 yards in length, the number of hurdles to be leaped being ten. The height varies from 2 feet 6 inches to 3 feet 6 inches, and the hurdles are placed at equal distances along the course. The contestants start together as for a running race, leaping each hurdle as it is reached. Skilled runners take exactly three steps between every two hurdles in the 120 yard course and always springing from the same foot.

Each hurdle, as it is reached, is cleared at a single stride, the jumper usually jumping from his right foot and landing on his left. He thus continues down through the hurdles, keeping his stride as in ordinary running, the only difference being that in every third stride he leaps into the air a sufficient height to clear the hurdles.

The rule of the National Amateur Athletic Union for hurdle races is as follows:

Different heights, distances, and number of hurdles may be selected for hurdle races.

In the 120 yards hurdle race, ten hurdles shall be used; each hurdle to be three feet six inches high. They shall be placed ten yards apart, with the first hurdle fifteen yards distance from the starting point, and the last hurdle fifteen yards before the finishing line. In the 220 yards hurdle race ten hurdles shall be used, each hurdle to be two feet six inches high. They shall be placed twenty yards apart, with the first hurdle twenty yards distant from the starting mark, and the last hurdle twenty yards before the finishing line.

In hurdle races of other distances

and with different numbers of hurdles, the hurdles shall be placed at equal intervals, with the same space between the first hurdle and the starting point and the last hurdle and the finishing line, as between each of the hurdles.

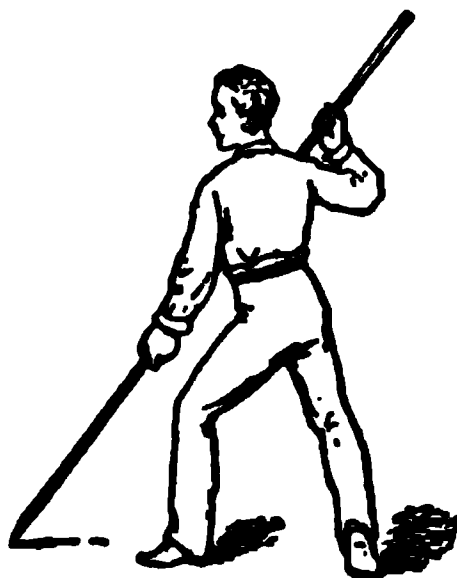
In making a record it shall be necessary for the competitor to jump over every hurdle in its proper position.

Pole Leaping consists in leaping with the aid of a stout wooden pole. The pole is generally made of ash, about $1\frac{3}{4}$ inches in diameter, and



Pole Leaping—First Position.

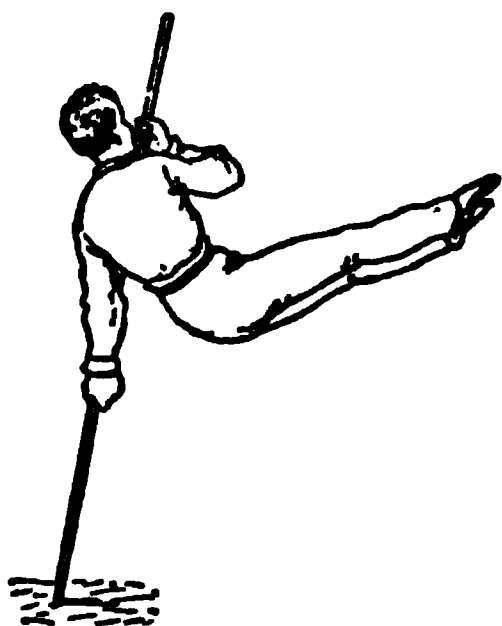
fifteen feet long. It should be quite smooth, and shod with an iron point at one end. To leap with the pole, the athlete stands holding



Pole Leaping—Second Position.

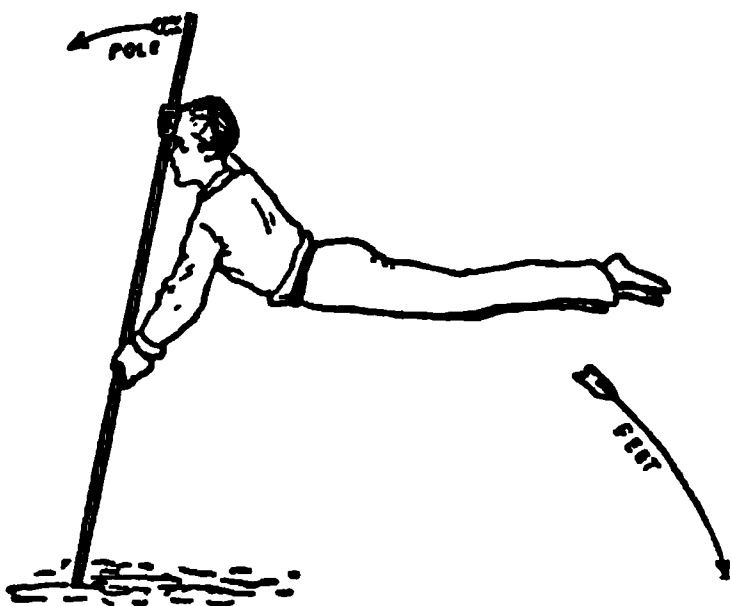
it as in the first illustration, the arms being bent and the hands the distance of the shoulders apart, the right hand toward the iron-shod end of the pole. Both palms may be up-

ward, or that of the right hand downward. The jumper then advances the right foot, and places the shod end of the pole on the ground at as great a distance as he deems expedient without moving his feet or hands, as in the second position;



Pole Leaping—Third Position.

then, looking toward the end of the pole, he springs forward and passes on the left side of the pole, as figured in the third and fourth positions, his whole body being held as nearly as possible in a straight line. As his feet touch the ground he brings



Pole Leaping—Fourth Position.

the pole to the first position again. The leap may be made with the left foot and hand advanced, in which case the leaper passes the pole on the right.

The high jump with the pole is made in like manner, save that when

the athlete is directly above the barrier, he loosens his grasp on the pole, and pushing it back, allows it to fall on one side while he himself descends upon the other.

To leap a distance or clear an obstacle, the jumper takes his position about 50 feet from the spot where he is to make his leap; then, holding the pole directly in front of him with the pointed end raised a foot or more from the ground, advancing slowly at first, and then more quickly, he approaches the spot at a run, and keeping his eye fixed on the place where he has determined to plant his pole, sets it into the ground and makes his leap into the air at the same instant. The rules of the National Amateur Athletic Union for pole vaulting are similar to those for jumping.

Putting the Shot. This contest consists in balancing the "shot,"—usually an iron ball weighing sixteen pounds,—on the hand, held just over the shoulder, and then by throwing the weight of the body forward and straightening the arm, hurling the weight forward as far as possible.

The rule of the National Amateur Athletic Union regarding this feat is as follows:

The shot shall be a solid sphere, made of metal and weighing at least 16 or 24 pounds, as the event may call for.

It shall be put with one hand, and in making the attempt it shall be above and not behind the shoulder.

The competitor shall stand in a circle seven feet in diameter, on four feet of the circumference of which shall be placed a board four inches high, at which the competitor must stand when the shot leaves his hand.

A fair put shall be one where no part of the person of the competitor shall touch in front of the circle or on the board in making the attempt.

A put shall be counted as foul if the competitor steps over the front half of the circle or on the board,

before the measurement of his put is made.

The measurement of all puts shall be made from the nearest mark made by the shot to a point on the circumference of the circle, on a line with the object mark and the center of the circle.

Foul puts and letting go the shot in making an attempt shall be counted as trial puts without result.

A board similar to the one in front may be used at the back of the circle.

The order of competing and number of trials shall be the same as for the running broad jump. Shots shall be furnished by the Games Committee. Any contestant may use his private shot, if correct in weight and shape; in which case the other contestants must also be allowed to use it, if they wish.

Putting the shot is interesting as a display of strength, but no one should try it who has not developed his mus-

strength and skill. The term "hammer" is rather misleading. It is simply a metal ball into which is fastened a supple hickory handle.

Putting Shot—Second Position.

The thrower grasps the handle near the end with both hands and whirling the ball around his head once or twice at arm's length, suddenly loosens his hold and allows it to fly through the air.

The rules of the Amateur Union governing this event are as follows:

The hammer-head shall be a metal sphere. The handle shall be of wood, the length of handle and head combined shall be four feet, and the combined weight shall be at least sixteen pounds.

All throws shall be made from a circle, seven feet in diameter.

The competitor may assume any position he chooses in making an attempt.

A fair throw shall be one when no part of the person of the competitor shall touch outside of the circle in making the attempt.

A throw shall be counted foul if the competitor steps over the front half of the circle before his throw is measured.

Putting Shot—First Position.

cles by other means, as the exertion required is very violent.

Throwing the Hammer. This is an old Scotch game, and, like putting the shot, requires a large amount of

Foul throws and letting go of the hammer in an attempt, shall count as trial throws.

The measurement of all throws shall be made from the nearest mark made by the head of the hammer, to a point on the circumference of the circle, on a line with the object mark and the center of the circle.

The order of competing and number of trials shall be the same as prescribed for the Running Broad Jump.

Hammers shall be furnished by the Games Committee. Any contestant may use his private hammer,

Throwing Hammer.

if correct in weight and shape; in which case the other contestants must also be allowed to use it, if they wish.

The thrower, in some contests, is allowed to run as far as he pleases before throwing the hammer, so long as he does not cross the "scratch line" from which the measurement is made. Sometimes he is allowed to run a fixed distance, as seven feet, and sometimes he is permitted to turn around once before throwing. Some throwers hold the hammer in one hand, and some in both.

Throwing the 55-lbs. Weight. Like the hammer, this weight is thrown with a handle, but instead of a straight stick, an iron ring or triangle, about six inches in diameter, is fastened to the weight by means of an iron staple. In this way the weight can be lifted and swung like a pail or a basket. In some contests the thrower is allowed to follow the weight on throwing it, and sometimes a run is allowed. The weight is sometimes thrown from between the legs, and sometimes from the side. Sometimes the contest is to see how high, and not how far, the weight can be thrown, and it is then said to be "thrown for height."

The Amateur Athletic Union rules for this event are as follows:

Section 1. The weight shall be a sphere made of metal, with a metal handle attached. Their combined weight shall be at least fifty-six pounds, and the combined height shall be sixteen inches, but no flexible attachment will be allowed.

All throws shall be made from a circle seven feet in diameter.

The competitor may assume any position he chooses in making an attempt.

Foul throws and letting go of the weight in an attempt shall count as a trial throw without result.

The order of competing and number of trials shall be the same as laid down for the jumping contests.

Sec. 2. In Throwing for Distance. A fair throw shall be one where no part of the person of the competitor shall touch in front of the circle in making an attempt.

A throw shall be counted foul if the competitor steps over the front half of the circle before his throw is measured.

The measurement of all throws shall be made from the nearest mark made by the sphere of the weight, to a point on the circumference of the circle, on a line with the object mark and the center of the circle.

Sec. 3. In Throwing for Height,

a barrel-head three feet in diameter shall be suspended in the air.

A fair throw shall be one where no part of the person of the competitor shall touch in front of the circle in making an attempt, and where any part of the weight or handle touches any part of the barrel-head.

A foul throw shall be one where the competitor touches outside the circle before letting go the weight.

The measurement of all throws shall be from a point on the ground drawn directly under and parallel to the lowest point of the barrel-head.

The order of competing and number of trials shall be the same as for the running broad jump. Weights shall be furnished by the Games Committee. Any contestant may use his private weight, if correct in weight or shape; in which case the other contestants must also be allowed to use it, if they wish.

Besides these standard games, the following are sometimes included:

Throwing the Base Ball. The thrower is generally allowed to run a certain distance before he throws, and the distance is measured from the line where he delivers the ball to the place where it strikes. This contest is seldom found on the programmes at athletic games of the present day.

Kicking the Football also finds a place in many college athletic exhibitions. The competition is sometimes for accuracy and sometimes for distance, and the ball is kicked either from the hand or from the ground according to agreement. When the contest is for accuracy, two tall posts are set in the ground twenty feet apart, and between these a cross-bar is fastened at a height of ten feet from the ground. The contestants then take their stand behind a line twenty-five or thirty yards from the poles, and the contest lies in seeing who can cause the greatest number of balls to pass between the posts and over the bar, in a given number of kicks.

Tossing the Caber. This is a Scotch feat, and is a feature of Caledonian games. It is, however, seldom an event in the meetings of American athletic associations. The caber is the trunk of a young tree and is heavier at one end than at the other. The athlete holds it perpendicularly, large end upward, balanced against the chest, and running, endeavors to toss it so that it falls on the large end and turns over. It is usually made so large that at first none of the contestants can perform the feat, and then a piece is sawn off each time, after all have tried, until some one succeeds. If more than one is successful, the one who tosses the caber farthest is the winner.

The Sack Race is a race between contestants enveloped up to the neck in cloth bags or sacks. Such a race is usually held to furnish amusement for the spectators, but sometimes as a genuine athletic sport.

High Kicking. A tin plate is suspended horizontally by three strings, like the pan of a balance, from an arm arranged to slide up and down an upright post. The pan is raised gradually higher and higher until only one of the contestants is able to touch it with his foot. A high kick may be made either running or standing, and jumping may or may not be allowed. The conditions are fixed by the club holding the contest.

A Three-Legged Race. This race, like the sack race, is run chiefly for the amusement of the spectators. The athletes run in pairs, the left leg of one being fastened to the right leg of the other, both at the knee and ankle. The men are obliged to keep perfect step, and with practice are able to attain considerable speed.

Wheelbarrow Race. Sometimes in games held for amusement merely, the contestants are required to wheel wheelbarrows. The sport is increased when the racers are blindfolded.

Records. When a person has performed one of the standard athletic

feats and has been properly timed or his distance properly measured, such time or measurement is said to be his record. The athlete who has made the best record for a given feat is said to "hold the record." There is much difference of opinion as to what a "record" is, some thinking that the measurement of any feat at any time is enough to make it good, while others insist that the feat must be performed at a public meeting and under the superintendence of proper officers. Many so-called remarkable records are accounted for by the fact they were improperly timed or made on badly measured

tracks. It is generally agreed, also, that a running record must be made at one of the standard distances (see above), and that it is absurd, for instance, to talk of the best record at 155 yards. Any one, if this were allowed, might make himself a champion by running some particular distance which no one had been timed on before. A list of the usual championship games has already been given. The record rules of the National Amateur Union are as follows:

A new record at any distance in walking, running or hurdling, in order to stand, shall be timed by at

Greek Foot Race.

least three time-keepers, and a new record at jumping, pole vaulting, or in the weight competitions, shall be measured by at least three measurers.

The Amateur Athletic Union will not recognize any new record, unless a report of it is made to the Secretary of the Union, properly supported by the affidavits of the time-keepers or the measurers, as the case may be.

History. Among the ancients athletics were held in high esteem. The grand athletic contests of the Greeks are described in C. P. P., in

the article OLYMPIA. (See also the history of GYMNASTICS.)

Athletic games have always been in favor in England. In the reign of Henry II., the youth of London had assigned them, near the city, fields where they practiced "leaping, wrestling, casting of the stone, and playing with the ball."

Henry V. was fond of athletics, especially of running, and is said to have been "so swift a runner that he and two of his lords, without bow or other engine, could take a wild buck in a large park." Henry VIII. excelled in throwing

the hammer, and his secretary, Richard Pace, advised noblemen's sons to devote themselves to athletic sports, "and leave study and learning to the children of meaner people." But with the rise of what is called "the new learning," some scholars began to speak slightly of athletics, and even Roger Ascham in his book on Archery says that "running, leaping, and quoiting be too vile for scholars." The upper

classes became divided in opinion on the subject, but athletic sports continued in favor with the common people. In a poem, published in 1608, a shepherd is made to say:

"I can both hurle and sling,
I run, I wrestle, I can well throw the bar."

The illustrations, taken from an old manuscript, show favorite trials of strength in the time of Queen Elizabeth.

Athletic sports were usually prac-



Sports in Queen Elizabeth's Time.

ticed also on church festivals, but the Puritans objected to them and from that time became opposed to all such sports. James I. issued in 1617 a "Book of Sports," in which he named those that were lawful on Sunday. When this was re-published by Charles I. it was severely condemned by the Puritans. When the Stuarts were restored, however, foot racing, wrestling, and other such contests were revived.

Great annual athletic meetings were held before the Norman con-

quest in different parts of England, in very ancient times. One of these, at Bath, is described by Addison in the *Spectator* (Vol. II., 161). These meetings, which were generally in connection with fairs, lasted almost until the present time, and gave rise to modern athletic associations. In the 18th century, besides these rustic meetings, people began to walk and run on wagers or for prizes, and persons of high rank, who for many centuries had looked down on such exercises, sometimes took part in them.

Many of the contests were ridiculous, as for instance when there was a race between cripples, or a man on stilts raced with a runner, or when a jockey bearing a man on his shoulders contended against a fat man. Some accounts of records made in those days are absurd. For instance, a man is said to have walked 102 miles in twelve hours. But athletic sports did not become popular with all classes till the present century, during which they have been reduced to a system, especially in England and the United States.

There are now in the United States several thousand athletic societies, many of which have gymnasiums, some of them elegantly equipped. There are more than twenty such clubs in New York City alone. The New York Athletic Club, formed in 1868, has a large club-house containing bowling alleys, swimming tanks, and one of the largest and best gymnasiums in the country. Nearly every college in the United States has its athletic association and gymnasium. The college clubs are united in the Intercollegiate Athletic Association, and this, with most other athletic associations in the country, is governed by the rules of the Amateur Athletic Union, which regulates nearly all the athletic contests held in the United States.

The first association of the kind was the National Association of Amateur Athletes of America. A few years ago dissensions arose in this association, and in October, 1887, a large number of the clubs withdrew and united under a new organization known as the Amateur Athletic Union. The two associations continued thus for two years, but in the summer of 1889 they united, retaining the new name of the Amateur Athletic Union.

AUCTION, a game played by any number of people with counters, representing money, and cards, on each of which is a picture of some article to be sold by auction, with its de-

scription and supposed money value. One of the players is chosen for auctioneer, and the counters are distributed equally among the others. The auctioneer then takes the cards and reads the description of the first article to be sold. The players bid for it, as in a real auction, and it is sold to the highest bidder, who puts the counters representing the price by themselves in front of him. The auctioneer then sells the next card and so on till all are sold. The player who has made the best bargains wins, and this is found out by counting the value of the articles he has bought, and that of the counters he has paid, which are in a pile in front of him. He wins, whose purchases exceed in value the price paid for them by the greatest amount. If a player bid more money than he has, it is a Bluff Bid. Unless he succeeds in getting the article, no notice is taken of it; but if, when he is called upon to pay, he is unable to do so, he must return one of his cards to the auctioneer. If he have none, he must return the first one he purchases.

AUCTIONEER, THE, a game played by any number of persons, one of whom acts as auctioneer. Each of the other players writes on a slip of paper the name of some article, and folds it once. The auctioneer then marks one of the slips, adds a blank one, and mixes them all in a hat. Each of the company draws a slip, and he who gets the blank slip is put up at auction by the auctioneer, each player bidding the article on his slip. The holder of the marked slip bids last, and the person bid for is sold to him. He may then require his purchase to perform some feat, and then the game is repeated. The auctioneer, instead of marking a slip, may simply open one and look at it, afterwards accepting the bid of the person who draws it whenever it may be offered. One slip always remains in the hat. The auctioneer should look at it, and if

it be the blank or the marked slip, the players must draw again. The auctioneer should give a comical description of the person to be sold, praising his appearance and good qualities.

AUCTION PITCH. See **ALL FOURS**.

AUNT SALLY, a game played by any number of persons, who throw sticks at the head of "Aunt Sally," a block of wood shaped and painted to resemble the face of an old colored woman. This is placed upon a

in a given number of throws is the winner.

AUTHORS, a game played by any number of persons with cards, on which are printed or written the name of an author and the titles of several of his works. The printed cards may be bought at toy stores, but much amusement may be had by writing them out, introducing recent books and new authors. The same titles, including that of the author, are on as many cards as there are titles, but arranged in different order, and the name at the top, which is in larger letters than the others, is called the name of the card. All the cards with the same words on them, taken together, form a book. Thus two of the cards in one book may appear as follows:

MISS ALCOTT	LITTLE WOMEN
—	—
LITTLE WOMEN	LITTLE MEN
LITTLE MEN	OLD-FASHIONED GIRL
OLD-FASHIONED GIRL	RIGHT COUSINS
RIGHT COUSINS	MISS ALCOTT

Aunt Sally.

pole set into the ground, and decorated with an old woman's cap. A dress is then put upon the figure and a tobacco pipe is stuck into the mouth. Sometimes pipes are stuck into the ears also.

The players stand about twenty-five feet from the figure, and, in turn, throw sticks, twenty inches to two feet in length, at Aunt Sally's head, trying to break the tobacco pipes. The side pipes count, each, one point, and the front one, two points. He who scores most points

In this book there would evidently be five cards. Sometimes there are six or more cards in a book, but all the books in the pack are of the same size, and there are usually twenty books in a pack. Sometimes the cards have numbers at the top, which are the same for all of the same book. The cards are distributed evenly by any one of the players, and then the one on the dealer's left calls by name for any card he wants from some one of the other players. If the player asked has the card he must give it to him, and the first player then calls for another card, and continues thus to call for cards till he asks for one which the other player does not have; then the privilege of asking passes to the next player at his left, and so on. As soon as any one succeeds in get-

ting into his hand all the cards in a book (which is the object of the calling), he lays them down together, near his place, and none of them can be called for any more. The calling goes on till all the pack is then distributed into books, and then he who has most books wins. When the cards are numbered, the winner is determined sometimes by adding the numbers on the books taken, the one who has the highest sum winning.

By listening attentively to the calls of the other players, one can generally get a very good idea of how the cards lie, and ask accordingly. If a player has called successfully for a card and has not laid aside the book containing it, the others know he still has it, and the next player, if he has been watchful, will call for the card. Again, if a player asks another for a card and is refused, all the others know that neither of them has it. In general, after calling for cards he is sure he can get, a player should try to complete the books in his hand that are most nearly full.

History. Authors is possibly derived from an old English game called "Spade, the Gardener," played with a pack of ordinary cards, from which all cards below the tens have been thrown out.

Each of the four kings is given a name, and the other cards of the

suit are regarded as his family. Thus, the King of Spades is called Spade, the Gardener; the Queen, Spade, the Gardener's Wife; the Knave, his son; the Ace, his servant, and the Ten, his dog. In like manner, the King of Clubs is called Club, the Constable; the King of Hearts, the Good Natured Man, and the King of Diamonds, Vicar Denn. Each of these has also his wife, son, servant, and dog. The object is to get all the cards into one hand, and when all a player's cards are gone he retires from the game.

The earliest similar game played with special cards seems to have been "Doctor Busby," where the cards had pictures representing numbers of various "families," each family constituting a book. The game of Doctor Busby is still sold at toy stores, but Authors, and similar forms of the game, are more popular. Among the similar games, all played in the same way, are "Famous Men" (where one book consists of Inventors, one of Soldiers, one of Artists, and so on), "Queens of Literature" (where all the authors named are women), "Poets," and "Gems of Art" (where each book contains the names of pictures in some famous art gallery). There are similar games in French and German, devoted not only to Authors but to familiar things to aid in learning the languages.

B

BACHELOR'S KITCHEN, a game played by any number of persons, who sit in a row, all except one, who goes from player to player, asking each what he will give to the bachelor's kitchen. When all have answered, the leader asks each all sorts of questions. The one questioned must give as his answer the name of the article he agreed to contribute. If he gives any other answer, or laugh, he must pay a forfeit.

When the questioner has succeeded in making any one laugh, or is satisfied that he cannot do so, he goes on to the next.

BACKGAMMON, a game played by two persons, each with 15 pieces, or men, and 2 dice, on a board like the one shown below. The men, of two colors, are usually the same as those used in checkers, and a backgammon board is generally made, for convenience sake, on the inside

of a checker board. The board is divided into two pairs of tables by a line through the middle called the bar (which is a raised partition when the game is played inside a checker-board), and each player has a home, or inner table, and an outer table. In the cut, A is Black's home or inner table, and B his outer table; and C is White's home, or inner table, and D his outer table. Each table has six points in it, of two colors placed alternately, generally black and white or black and red. The points in the inner table, beginning at the edge of the board, are sometimes given French names, as the ace, deuce, trois, quatre, cinq, and

A B

C D
Backgammon Board.

six points, but in the United States they are more commonly called by the numbers from one to six. For convenience sake, the numbers in the illustration are continued across the board to 12. The point numbered 7 is sometimes called the bar point. The men are set as in the illustration, part of them being, it will be noticed, in the enemy's tables. The object of each player is to get his own men around into his own inner table, where he can play them off, as will be shown hereafter. In doing this, the two move in opposite directions, Black from White's inner table into White's outer table, then across into his own outer table, and

finally into his own inner table, or following the course C D B A in the cut, while White moves in the direction A B D C into his home or inner table. The moves are decided by throwing DICE, of which each player has two. When a player makes his throw, he calls out the number of points on the top of the dice (as 4-2, 6-3, or double 4) and then plays any of his men a number of points on the board equal to the number thrown. He may play one man as many points as are on the two dice, or he may play each number with a different man. If he throws two like numbers (called doublets) he plays double what he throws. For instance, if he throws two 4's he has the right to play four 4's instead of two, and these moves may be made all together or separately. If the point at which any move ends is occupied by two or more hostile men, that move cannot be made, and if the player cannot move at all, he must wait till his next turn. If the point has only one hostile man on it, it is called a blot, and the move can then be made (which is sometimes called hitting the blot). The man so hit, or captured, is taken from the board, or placed on the bar. Its owner can make no move till he has entered his piece again in his opponent's inner table, by playing it as if it were on a point just before the ace point. If each point on this table has two or more hostile men on it the player whose man is up cannot play at all till his opponent has moved some of them. Generally, leaving a man uncovered, that is, leaving only one man on a point, should be avoided, and when doublets are thrown, the men are usually moved in pairs for this reason; but skillful players often make blots on purpose, either because they are willing to take the risk in order to move their men quicker, or in order that the men, when taken up, may enter anew, and gain the enemy's rear so as to be able to capture his men. When all a player's

men have reached his inner table, he begins to play them off the board, which is called casting off, throwing off, or bearing off. In casting off, the pieces count according to the point they are on. For instance, throwing 5 and 2 entitles a player to cast off one man from his five point and one from his two point, or one or both the numbers may be played as moves. It is an advantage to keep the points in the table covered as evenly as possible, so that every throw of the dice may be of use. If there are no men on the proper point, and no move can be made, men from a lower point may be thrown off. The player who first throws off his men wins the game. If his opponent has thrown off any of his men, a victory counts as a single game, or hit; if he has not thrown off any, it counts as a double game, or gammon; and if he has a man up, or one in either of the winner's tables it counts as a triple or quadruple game (as agreed on), or backgammon. Skillful players will often make different moves according as they wish to make a gammon or a hit.

RULES OF THE GAME.

1. The first move is decided by lot; each player throws a single die, and the one that gets the highest number plays first, having the privilege of moving from these throws, taken together, or of throwing as usual, as he pleases.

2. If a man is taken from any point, it must be played, and when it has been placed on a point and left, the move cannot be made over again.

3. If the owner of a man that has been taken up cast off another man before entering the one taken up, all the men so cast off must be treated as if they had been taken up.

4. If a player throw and play out of turn, and his opponent has thrown, the move can be changed only by consent of both players.

First Plays.

The following, which are usually

considered the best first moves in playing for a hit, will be understood by reference to the illustration at the beginning of the article. In all these, it will be seen that the object is, first to cover important points in the player's own tables, and then to get his men out of the enemy's tables.

1. If double aces are thrown (the best of all first throws), two men should be moved from the player's 6 to his 5 point, and two from his 8 to his 7 point, as it is desirable to prevent the enemy from gaining these points.

2. Double 6's; two men from 1 to 7 in the opposite tables and two from the opposite 12 to the player's 7.

3. Double 3's; two from 8 to 5, and two from 6 to 3, in the player's tables, thus protecting the 5 and 3 points.

4. Double 2's; two from 6 to 4 in the player's tables, protecting the 4 point, and two from 1 to 2 in the opposite tables, thus advancing one step toward getting out of the enemy's tables.

5. Double 4's; two from 1 to 5 in the opposite tables, and two from the opposite 12 to the player's 9.

6. Double 5's; two from the opposite 12 to the player's 8 and then to his 3.

7. 6 and ace; one from opposite 12 to the player's 7, and one from 8 to 7, thus securing the bar point.

8. 6-2; one from the opposite 12 to the player's 5. (In this and similar plays, where two moves are made at once, it must be remembered that the two are distinct, and that if one is blocked it cannot be made. But either number may be played first, and thus a block may often be avoided or a hostile man taken.)

9. 6-3, 6-4, 6-5, and 5-4; in each case play one from the opposite ace point as far as it can go.

10. 5-3; one from 6 to 3, and one from 8 to 3 in the player's tables.

11. 5-2; two from the opposite 12; one to the player's 8, and one to his 11.

12. 5-1; one from the opposite 12 to the player's 8, and one from the opposite ace point to 2.

13. 4-3; two from the opposite 12; one to the player's 9, and the other to his 10.

14. 4-2; one from 8 to 4, and one from 6 to 4 in the player's tables.

15. 4-1; one from the opposite 12 to the player's 9, and one from the opposite ace point to 2.

16. 3-2; two from the opposite 12; one to the player's 10, the other to his 11.

17. 3-1; one from 8 to 5, one from 6 to 5 in the player's tables.

18. 2-1; one from the opposite 12 to the player's 11, and one from the opposite ace point to 2.

Russian Backgammon, or Trio-Trac, a kind of backgammon in which the men are not set on the board in the beginning, but are entered, as if they had been taken up. Both players enter in the same table and move in the same direction. The player may move before entering all his men, but if a man be taken up, it must be entered before any other play can be made, and if this is impossible its owner loses his turn. If doublets are thrown, after playing them the numbers on the opposite sides of the dice are also played, and then the player is allowed another throw; thus he can keep on playing so long as he throws doublets and can make his moves. But if he cannot make any move his play must stop. The privilege of playing the numbers on the opposite side of the dice is sometimes not given to the first throw of doublets. It is sometimes extended by letting any one who throws an ace and a two play doublets of them and both of the opposite numbers (six and five), and then, after playing them, throw again. The rules are the same as for ordinary backgammon.

Spanish Backgammon, or Jacquet. In this form of the game there is no taking up, and a single man there-

fore can hold a point. Each player places his men in five rows of three each in his opponent's inner table. The first man moved must be carried into the player's own inner table before another is moved, but after that

Abacus.

the men can be moved in any order the player chooses.

History. The origin of backgammon is unknown. It is said to have been invented about the 10th century, though a similar game was played by the ancients on a board called an Abacus. It was first called Tables,

Backgammon in the 13th Century.

and is mentioned under this name by Chaucer, Shakespeare, and Bacon. In monkish Latin it was called *Tabularum Ludus* (Game of Tables). The tables were not always as they are now. In the illustration, showing two players of the 13th century,

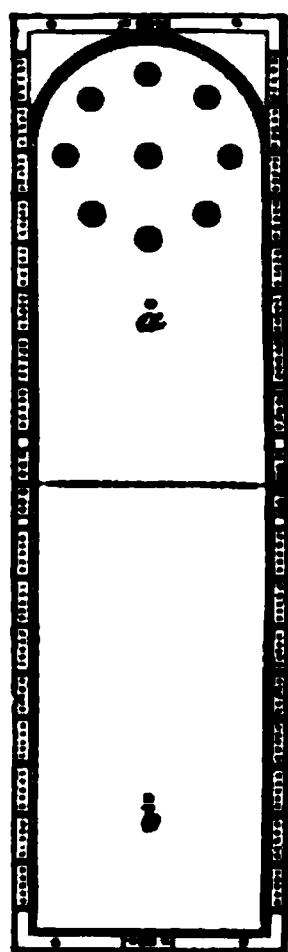
the form at that time is plainly shown. There is no bar on the board and there seem to be but eight points. In the 14th century the board was divided like ours, but the points were of only one color. There were many ways of playing, in some of which three dice were used and the men all set in the opponent's inner table. Tables was one of the indoor games that James I. recommended to his son Prince Henry in his book of advice called "*Basilikon Doron*" (The Royal Gift). The word backgammon is thought by some to be from the Welsh and to mean little battle. Others think it is Saxon and means back-game, from the setting back of the men when taken up; and others still that it is Danish and means the tray game, from the shape of the board. In Germany it is called Puff (Clatter), probably from the rattling of the dice or the pieces on the board. The French Tric-Trac, which is the same in German, and was anciently called tick-tack in English, is named in the same way. In Germany, backgammon is also called Brettspiel (board-game), and so is draughts.

BACK-HANDED EUCHRE. See EUCHRE.

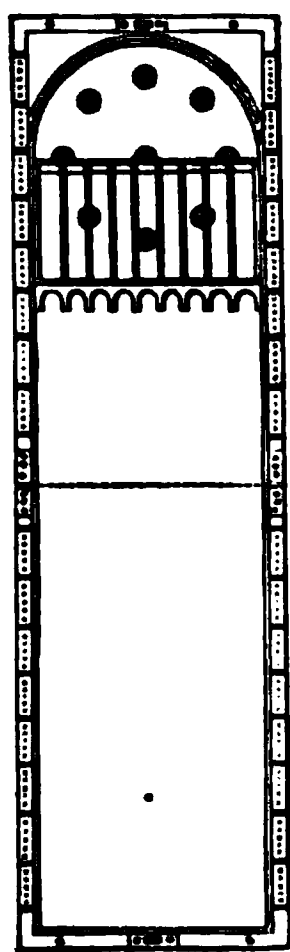
BADMINTON. See LAWN TENNIS.

BAGATELLE, a game played by any number of persons with cues and balls like those used in BILLIARDS, but smaller, on a table something like a small Billiard table, cushioned only at the sides, or on a cloth covered board, which can be laid on an ordinary table. Nine balls, two of which are colored, are used. At the lower end of the table are nine holes, numbered in order, and in front of the holes is a spot *a* on which one of the colored balls, often called the King Ball, is placed. At the upper end of the table is another spot, *b*, and between it and the holes a line called the string line, as in Billiards. Each player in turn plays his eight balls one by one, the colored one first, by

placing each on the spot behind the string line and striking it with his cue, as in Billiards, toward the holes. The object is to place the balls, including the King Ball, in the holes, and the player scores the numbers of such holes as he can fill, the colored balls counting double. Thus the highest score would be 62, made by filling all the holes, the colored balls being in the Nine and Eight holes. Such a score is very unusual. He wins who scores most points in a number of rounds agreed upon before the game. If any ball rebounds beyond the string line, it must be removed from the board till the next player's turn. At the end of each turn the board is cleared, and the King Ball placed on its spot, as in the beginning. The three-ball game of BILLIARDS may be played on a Bagatelle board, caroms counting one each, and each hole its proper number as in ordinary Bagatelle.



Bagatelle Board.



Mississippi Board.

score unless it hits the side of the board before entering them.

Mississippi, a kind of Bagatelle played with a bridge or row of stalls which is placed on the board just in front of the holes. The stalls are numbered from one to nine, but no ball is allowed to

up alternately so as to keep one or the other always in air, and then

that one ball is always seen moving from left to right above two others,



Fig. 4.

both at once, to exactly the same height.

7. *Double Inside Fall.* (Fig. 7.) The Inside Fall with two balls one in



Fig. 7.

which are changing hands in a lower curve.

10. *Shower.* (Fig. 10). The balls



Fig. 5.

each hand. The tracks of the balls would naturally cross, and that they may not interfere that of the ball from the right hand is made higher than the other.



Fig. 6.

8. *Triple Pass.* (Fig. 8.) The same as the last, with the addition of a third ball, which simply follows in the path of the others. The introduction of a third ball will complicate matters and require even more practice than the preceding exercises.

9. *Triple Over and Under Pass.* Like the last (Fig. 9), except that one of the balls from the left hand to the right is sent higher than either of the others, so



Fig. 8.

follow exactly the same path, going from one hand to the other by the



Fig. 9.

Inside Fall and back by the Horizontal Pass. Showers can be performed

with two, three, or four balls. A two-ball shower may be performed with one hand, in which case either the

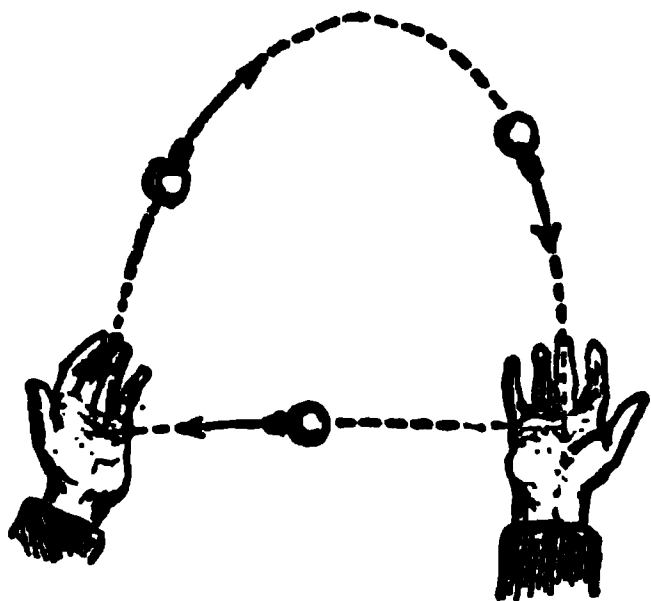


Fig. 10.

Inside or Outside Fall is used, and one of the balls, after being caught, is carried by the hand back to the

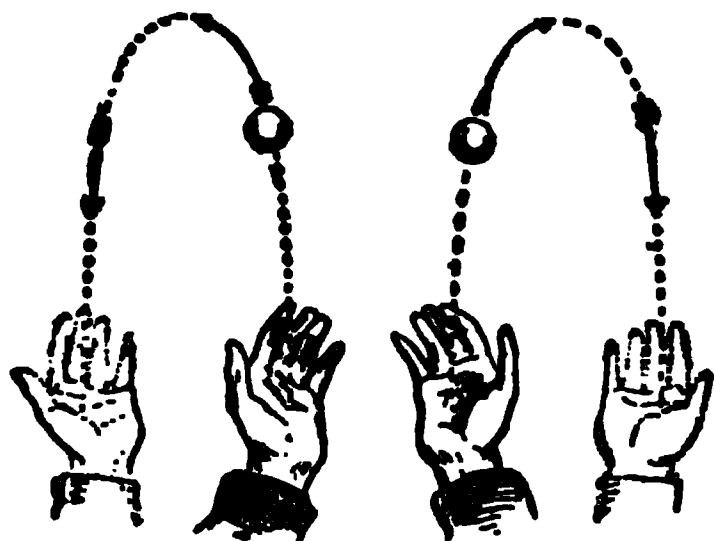


Fig. 11.

throwing place, while the other is in the air.

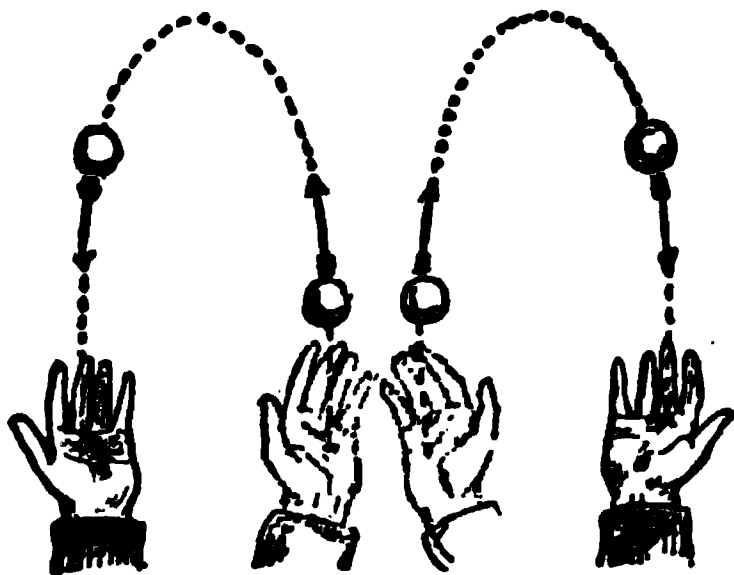


Fig. 12.

11. *Fountains*, combinations of the Inside and Outside Falls. In the

Single Fountain (Fig. 11), a ball is used by each hand and with each the outside fall is performed. In the Double Fountain (Fig. 12), each hand showers two balls, and the balls do not pass from one hand to the other.

The natives of the South Sea Islands are said to be very skillful at ball juggling, using small round fruits, or balls made of rolled leaves, and keeping as many as five in the air at once. Sometimes, also, a sort of bat, made of a stick of wood with a short cross-piece at the end, is used to strike the ball, instead of tossing it up with the hand.

BALLS AND BALL GAMES.

Games in which a ball is used have been played since the most ancient times. Greek and Roman writers tell different stories about the invention of such games, but probably none of these are true. The ball is such a simple toy, and so easily made, that it has doubtless been used by all nations from the earliest times, and it is not necessary to suppose that it was derived by them all from one tribe or people. It was known to the Egyptians, and the picture, from an old wall-painting, shows a game played by them, in which two of the players sat on others' backs. Homer describes in the "Odyssey" a game of ball played by a Greek princess and her companions to the sound of music. The Greeks called the ball *Sphaira*, from which we get the word sphere, and the Roman name for it was *Pila*. Both nations were very fond of playing with it, and both had many games, in most of which a small ball was thrown from one player to another. The Greeks valued it so highly that they had special teachers of the game in their gymnasiums; and the Athenians erected a statue to a skillful ball-player named Aristonicus. The Emperor Augustus was fond of the sport, and after his time it was commonly played just before taking a bath, in a room attached to the bathing house. The Romans also played with a large ball

like a foot-ball, called *Follis*, but they seem to have thrown instead of kicked it. In one game, called *Harpastum* (from a Greek word meaning to snatch), each player tried to get possession of the ball, as in modern FOOT-BALL. In Brittany, a game like Harpastum was played till modern times with a sort of foot-ball stuffed with hay, called *Soule*. Two communes usually fought for it, each try-

ing to carry it home, and men were so often maimed and wounded in the struggle that the game was suppressed by law. The Australian natives have a similar game, where a ball of opossum skin is "hunted out" as in FOOT-BALL and then struggled for. They call it *Marn Gook*. In another class of games, played with a large ball, the players try to put it across the enemy's boundary instead

Egyptian Ball.

of ... in their own. The common ball) was the modern Hurling. The former, an Irish sport, consists in carrying by hand a large ball across the opposite boundary, which

or Rome, and this kind of game seems to have originated in the East. The bat and ball games, such as CRICKET, BASE BALL, and CAT, seem to be still later, like the various TENNIS games, including Racket, Fives, and HAND BALL, where the ball is sent against a wall. But all these forms of Ball have so many points in common that it is difficult to trace their history, and authorities generally differ as to the exact course of their development. What is known of each is told in the separate article treating of it. The illustration, from a painting in the baths of Titus, shows four persons playing some kind of a ball game before entering the bath.

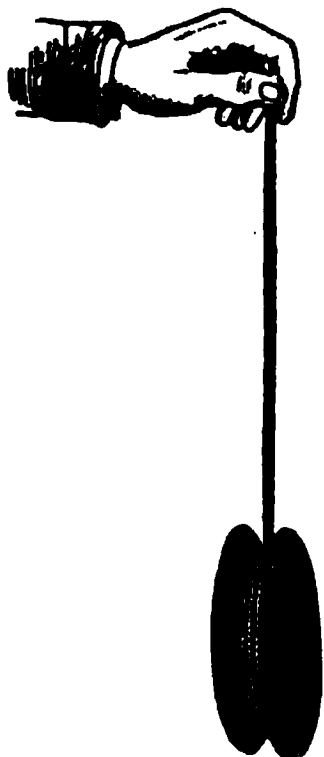
Roman Ball.

may be distant by several miles. The struggle for possession of the ball is often severe and the game is very rough. No ball game played with a stick, like HOCKEY, POLO, or CROQUET, was known in Ancient Greece

BANDILORE, a toy consisting of two discs joined at the center and having a string wound between them. The player takes one end of the string and allows the bandilore to fall, revolving as the string unwinds. Just before it reaches the end of the

string he gives it a quick jerk upwards, and the spin it has acquired will then wind the string in the opposite direction, and cause the toy to ascend. It can thus be kept moving up and down as long as the player pleases.

History. The origin of the Bandilore is not certainly known, though some say it was invented to amuse an East Indian princess. It was brought in 1790 from Bengal to England, where it became fashionable under the name of the "Quiz." Thence it was taken to Normandy, where it was called "Joujou." Soon afterward it became the fashion in Paris.



Bandilore.

The toys were made of all kinds of materials, from sugar to gold, and some of them were as large as dinner plates. The Duke of Orleans gave to a French lady a Bandilore set with diamonds, valued at 2400 livres. The toy is now known in France as *L'Émigrant* (The Emigrant), because it was in favor with the nobility at the beginning of the French Revolution, when many of them were forced to emigrate to other countries.

BANJO, Experiments with. See VIOLIN.

BARBERRY BUSH, a singing game played by any number of children. All join hands in a ring, and circle around, singing:

They then stop, and rubbing their hands together to imitate the washing of dishes, sing:

This is the way we wash our clothes,
Wash our clothes, wash our clothes,
This is the way we wash our clothes,
So early on Monday morning.

The players then circle as before, singing the chorus with "Tuesday" substituted for Monday. So the game goes on, the successive verses being generally as follows:

This is the way we iron our clothes,
So early on Tuesday morning.

This is the way we scrub our floor,
So early on Wednesday morning.

This is the way we mend our clothes,
So early on Thursday morning.

This is the way we sweep the house,
So early on Friday morning.

This is the way we bake our bread,
So early on Saturday morning.

This is the way we go to church,
So early on Sunday morning.

The chorus is repeated before each verse, with the insertion of the proper day of the week.

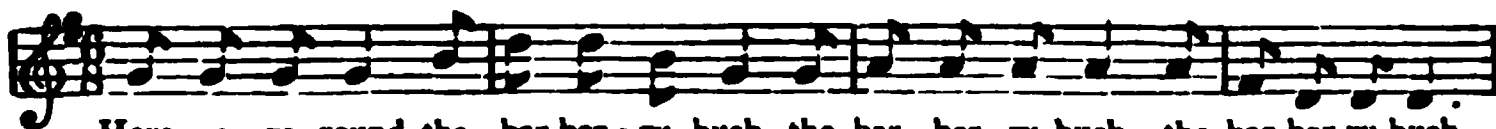
Sometimes the Mulberry bush is mentioned instead of the Barberry bush. The last line is also sung,

All of a Monday morning,

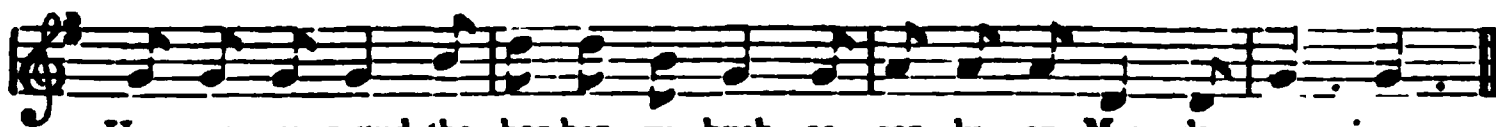
or

All on a frosty morning.

BAROMETER. The barometer and its history are told of in C. C. T. To make a mercury barometer, take a glass tube four feet long, and about a quarter of an inch in inside diameter, and bend it into a U shape, at about a foot from one end, so that the longer branch shall measure at least 33 inches. Make the bend gradually, allowing several inches at the turn (see directions for glass working, under CHEMICAL EXPERIMENTS).



Here we go round the bar-ber-ry bush, the bar-ber-ry bush, the bar-ber-ry bush.



Here we go round the bar-ber-ry bush so ear-ly on Mon-day morn-ing.

Seal the long end air-tight by melting it, and then fill that end with mercury by pouring it little by little into the short end, then turning the tube so that the mercury will run around the bend. This will require much patience, as the long end of the tube is full of air which finds difficulty in bubbling past the heavy mercury in a small tube. The tube and mercury should both be warmed so as to be dry, and the mercury must be perfectly clean. When the long end of the tube and the bend are full, hold the tube upright and the mercury in the long end will fall a little way, leaving an empty space at the top. If it does not, pour a little mercury out of the short end. The distance between the level of the mercury in the short end and that in the long end will be about 30 inches. To measure the height readily, and so tell whether the barometer is rising or falling, fasten the tube to a smooth board by bands of cloth, tacked at the ends, and nail to the board. The branches of the tube follow the rule. Then if the distance between the other at $33\frac{1}{2}$ inches and the other at $29\frac{1}{2}$ inches, the height of the barometer.

BASE BALL, a game played by nine persons, nine on a side, on a field marked with bases as in the diagram.

The field and implements are fully described in the appended rules.

The players on the side in the field are named the Pitcher and the Catcher (who together are often called the "battery"); the First, Second, and Third Base-keepers or Basemen; the Short-Stop; and the Right, Center, and Left Fielders. The three last mentioned are called the Out-field; the others, the In-field. Before the game the two leaders or captains usually decide by lot which shall have the choice of innings, and the winner may choose to go to the bat or into the field. In match games the captain of the home club

has choice of the innings. The players on the side that goes to the field, who are often called the "outs," take up the positions shown on the diagram. Each baseman generally stands near his base; the other players may vary their positions considerably, except the Pitcher, who, while delivering the ball, must stand within certain limits, as shown in Rules 8 and 29 below.

The Pitcher now throws the ball toward one of the other side, called the "Batsman," who stands at home base. If the Batsman strike at the ball without hitting it, he is said to have made a "strike." If the ball is "good,"—that is, passes over the home base not higher than the Batsman's shoulder and not lower than his knee,—it is counted a "called strike," although he make no attempt to hit at it. A strike is also called, as a penalty, on the batsman in certain other cases. (See Rule 43, below.)

If the ball is not good and the player does not strike at it, it is said to be a "ball," or a "called ball." All "strikes" and "balls" are called by an umpire, who stands near the Batsman and decides each point as it comes up. (Two umpires are sometimes necessary. See Rule 56, below.) If the player strike the ball and it fall within the lines in the diagram called the "foul lines," it is said to be a "fair ball," and the player becomes a "base-runner" and immediately starts toward the "first base." If the batted ball be a "ground hit" to the infield, the player getting the ball should throw it quickly to the First Baseman. Balls hit along the ground to the outfielders are seldom thrown to First Base, because the runner would reach the base long before the ball. It is oftentimes a better play to throw the ball to some other base when there are other runners on base. This will be explained later.

If the Batsman can touch first base before the Baseman standing

on the base catches and holds the ball, the former is said to have "made his base," and remains there; otherwise he is said to have been

"put out," and he does not bat again until the eight other players on his side have had their turn "at the bat." If, however, the ball,

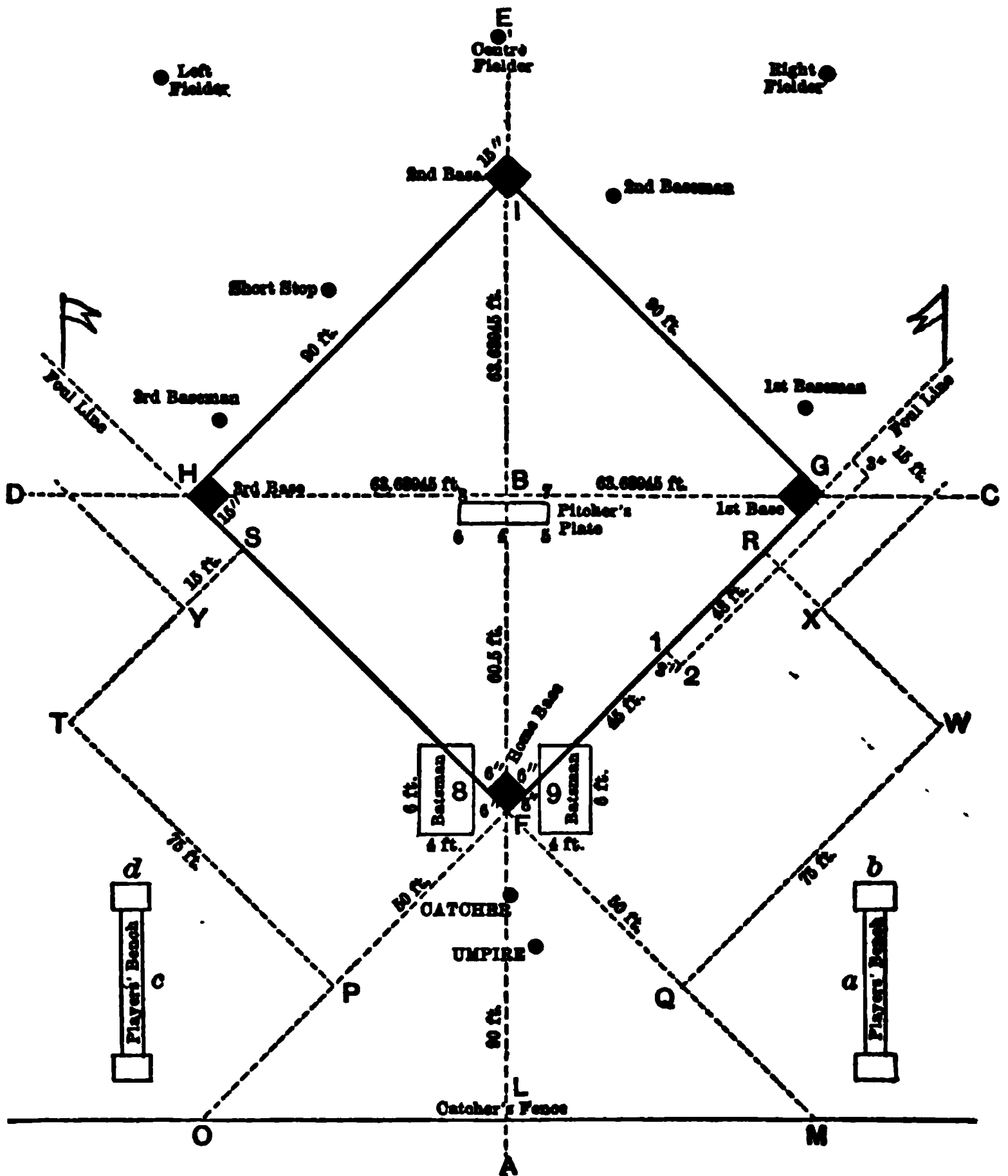


Diagram of Field.

when struck, instead of being fair, falls outside the foul lines it counts for nothing, unless it be caught on the "fly" by one of the other side, which puts the Striker out. The Striker cannot make his base on it,

and it is neither a strike nor a ball. When a ball is just touched by the bat and flies directly back of the batsman, it is called a "foul tip." Sometimes a foul tip is hard to tell from a simple ball. If three

ikes are called by the umpire, the riker must run for his base, and the ll, after it passes the home plate, treated just like a fair ball struck. the Catcher catches it and holds or if he can get it to first base be- re the Batsman, the latter is out. four balls are called, the Batsman allowed to "take his base"—that to run to first base without any ndrance.

Sometimes the batsman so hits the ll that, although he is himself put t, he enables a base-runner to reach other base. He is then said to ave made a "sacrifice hit."

When a player either has been put ut or has made his base, another

at the same time, he must leave the base before the base-runner following him reaches it. When a player is thus compelled to leave his base, he is said to be "forced." A base-runner usually keeps close to his base while the ball is near him, but when it is in the hands of the Pitcher or the Catcher he "leads off" a short distance toward the next base, so as to be ready to run to it should the Batsman strike a fair ball. When a foul ball is struck, all base-running after the ball leaves the bat is void, and the runners must return to the bases from which they started, re-touching the bases they have just left. Sometimes a base-runner can make his next base by leading off and then running while the ball is being thrown by the Pitcher to the Catcher, hoping to reach the base before the latter can throw the ball to the Baseman. This is called "stealing a base." If the ball is thrown to the Baseman before the runner makes his base, he may then try to return to his former base, if it has not been occupied by another player. The basemen on each side of him then usually try to put him out by throwing the ball from one to the other, while they walk toward each other, keeping the runner between them till one is near enough to touch him. This is called "running out between bases," but it does not happen often with skillful players. Sometimes, in such a case, the runner will manage to slip past one of the basemen and make his base. In any case where there is a dispute as to whether a man has been put out or not, the umpire decides, as he does in all disputed points throughout the game. Sometimes a baseman, after putting out a man, can get the ball to another base in time to put out someone else, or a fielder, after catching a fly and thus putting the striker out, may throw out a base-runner. These and similar cases are called "double-plays." If three men are thus put

Shoe Plate.

One of the same side takes his place as Batsman. The striking order is decided before the game and remains the same throughout. When a base-runner has reached first base, his object is to pass in succession second, third, and home base, and if he succeed in reaching the last-named without being put out, he scores one run for his side. He can be put out, after he has reached first base by being touched with the ball in the hands of one of the opposite side while he is not touching a base, and in other ways as told in Rule 50; but these do not often occur. He cannot be put out while he is standing on a base; but as two players cannot occupy the same base

out, it is a "triple-play," but this occurs very seldom. When the Catcher lets a ball from the Pitcher pass him (called a "passed ball"), and the back-stop is placed at ninety feet back of the home plate, the runner may take as many bases as he is able. When the back-stop is not so placed, only one base is allowed. Sometimes the Batsman will strike the ball so far that he can safely run to second or third base, or even around to home base. In the last case he makes a "home run," while at the same time sending in all the base-runners ahead of him, if any are on base at the time. Thus, by a skillful hit when the bases are "full," a Batsman may enable four runners to score. As soon as three players are out, the sides change places, and, if no one has reached home base, the score for that inning of the side that has just left the bat is nothing, no matter how many men may be on bases. The game goes on as before with the sides reversed, and when three men of the second side have been put out the first inning is ended. In any inning that man goes first to the bat whose name follows, in the batting order, that of the one who last *completed* his time at the bat (not the one who was out last or the one who went to the bat last) in the previous inning.

The game consists of nine such innings, and the side that scores the most runs is the winner. If the same number of runs has been scored by each side at the end of the ninth inning, a tenth must be played, or more, if necessary, till the game is decided. Each inning is divided into halves, during each of which a different side is at the bat. At the end of an entire inning, when the sides have been at the bat the same number of times, the innings are said to be "even"; but when the side that struck first has been at the bat once more than the other, the innings are said to be "uneven." If the

side that would go to the bat last is ahead at the middle of the ninth or any subsequent inning, the last half of that inning is omitted, as it could not affect the result of the game, but only increase the winners' score. Similarly, if the side last at bat scores the winning run before putting out its three men, the rest of the inning is omitted.

If a player reaches his base, he does so either because he made so good a hit that the best fielding could not have put him out, or because one of the fielders did not do his duty. In the former case, the Batsman is said to have made a base-hit, or a two-, three-, or four-base hit, as the case may be; in the latter case, the fielder is said to have made an "error." Likewise, a fielder that allows a base-runner to make a new base, when he might have stopped him, makes an error. A run made entirely without the aid of errors on the opposite side is called an "earned run." Errors, base-hits, and earned runs are scored, not because they count in deciding the results, but because they serve to show whether a game is won by the skill of the winners or the carelessness or bad playing of the losers; and they also show which are the best players on a side. They are more carefully considered under *Scoring*.

The Catcher. This player usually wears gloves, made for the purpose, to protect his hands, a cage, or mask, of strong steel wire over his face, and sometimes a padded body protector, as in Figure 1. When there are no men on bases, and the batsman has less than two strikes, the Catcher usually stands back and takes the Pitcher's balls on the first bounce, or allows them to strike the high board fence at his rear without trying to catch them. When the Batsman has two strikes, the Catcher stands close to him (called playing close to, or behind, the bat), so that at the next strike he may catch the ball on the fly, and so

put the striker out. When there is a man on third base, he also

tries to "throw them out" if possible. He tries to catch those foul balls that are struck to the Batsman's rear, and any fair balls that fall but a short distance in front of the Home-plate. When a fair ball falls between Catcher and Pitcher, or in any other case where it is doubtful which player should take a ball, the captain of the side calls out the name of the one he wishes to catch it. Besides these duties, the Catcher generally acts as Home-Baseman.

Catcher.—Fig. 1.

plays close to the bat, so as to give the base-runner no chance to reach

Pitcher.

The Pitcher. His chief duty is to throw his ball so that the Batsman will find difficulty in striking it. For this purpose he often throws the ball in a curve, so that the Batsman is puzzled to know just where it will cross the home-plate. This is done by giving the ball a twist as it is thrown. A swiftly moving ball pushes the air in front of it into a sort of elastic cushion, and if the ball is twisting at the same time the cushion will be a little more elastic on

Catcher.—Fig. 2.

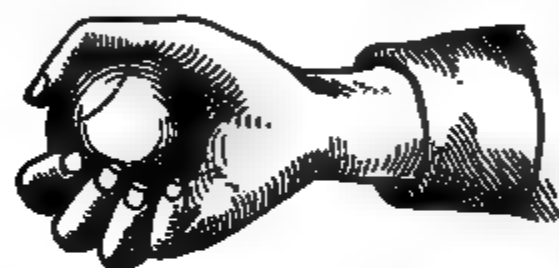
home. He keeps on the lookout to see that no men "steal" bases, and

one side than on the other, pushing the ball slightly sideways, and thus making its path a curve. By mak-



Straight Delivery.

ing the ball twirl in one direction or another, the skillful Pitcher can curve it to the right or to the left upward



In-Curve.

or downward, so that only a batsman of equal skill can strike it at all. The illustrations show the positions of the hand and body for various

curves. It requires much judgment to make a curved ball pass over the Home-plate, for when it leaves the Pitcher's hand it seems as if it were going to pass to one-side. That the Catcher may not be puzzled as well as the Batsman, the Pitcher makes signals, usually by moving his hand or head, to tell the

Catcher how the ball is to be curved. When he is pitching the ball, he must not step

outside of the lines that determine his position, as laid down in the rules. While engaged in pitching the ball the Pitcher must also keep close watch of the base-runners, trying to put them out by throwing the ball to the bases when they are off their guard. He should also be ready to "back up" the Catcher, or stand behind him, when the ball is thrown in from the field to put a runner out at home. Sometimes he backs up the First Baseman in like manner. The Pitcher must not pretend to deliver the ball without doing so. If he does, he is said to have made a "balk," and the Batsman is allowed to go to first base. (See Rule 32.)

In-Curve.

The Baseman.

The principal duty of the Baseman is to guard his base and be ready to put out any base-runner who is trying to make it. The First Baseman usually does this simply by catching the ball and touching his base before the runner — the others, in most cases, put the runner out by touching him with the ball before he reaches the base.

Out-Curve.

When, however, the runner is "forced" the basemen need only touch the base before the runner

while holding the ball. The basemen also act as fielders, and render assistance, when they can, in backing up other players.

The Fielders.

The duty of the fielders is to catch all fair and foul balls they can "on the fly," and to "field" or throw all balls as quickly as possible to the proper place. This place varies according to the state of the game and the position of the fielder. If

Drop.

there is no man on Third Base, and there is one on First and on Second Base, the ball goes either to Second or Third Base, ac-

a man's scoring. But if the fielder sees he cannot possibly get the ball to Home Base in time, he throws

Short Stop.

it to one of the other bases. Or, if there are already two out, he may throw it to First Base, knowing that no matter if there is a man on

Fielder.

cording to the chances for intercepting the runner. If there is a man on Third, the ball is usually thrown to Home Base, for it is of the first importance to prevent

Batsman.

Third Base his run cannot count after the third out. It requires careful judgment in the fielder to know ex-

actly what to do in many cases, and he must decide instantly, as a second's delay might lose the game. An out-fielder may be idle during a great part of the game, but he must be ready to act at any moment, and on no account allow a ball to pass him.

The Short Stop is an in-fielder, placed where batsmen are very apt to strike their balls, as experience shows.

The Batsman. The Batsman strives to strike his ball in the place where it is least expected, or where it will be hardest to reach. If he sees that the Pitcher is giving him a good ball, he usually strikes at it, for it will be counted as a strike whether he does so or not; but a bad ball he lets pass him, unless he sees that he can make a good hit with it. As soon as the Batsman strikes a ball he runs,

1	Boodidge	2	.		$\frac{F-L}{3}$		$\frac{F-B}{1}$	.	+			2	1	"	"	1
2	Olsted	1r	$\frac{B-A}{1}$			+	+	+	$\frac{F-B}{3}$			2	3	"	"	1
3	Nichols	cf	$\frac{C-A}{1}$			$\frac{S-B}{1}$	$\frac{B-H}{2}$		$\frac{F-S}{2}$	+	.	1	1		"	1
4	Baker	ss	$\frac{A}{3}$			.	$\frac{B-A}{3}$			+	.	2	1	"	"	1
5	Crocker	c.		$\frac{F-S}{1}$		+		$\frac{B-H}{1}$			$\frac{H-B}{1}$	1	2	"	"	
6	Hall	rf		$\frac{C-A}{2}$		.		$\frac{F-R}{2}$	$\frac{B-H}{3}$		$\frac{B-A}{2}$	1	0			
7	Lovring	1		$\frac{F-S}{2}$		$\frac{-B}{2}$		$\frac{K}{3}$		$\frac{F-R}{1}$	$\frac{K}{3}$	0	0	"	"	1
8	Beah	p.			$\frac{KHA}{1}$			.	$\frac{K}{2}$			1	0		"	
9	Le Moyne	3			$\frac{KHA}{2}$		$\frac{K}{3}$		$\frac{S-H}{1}$	+		0	1	"	"	2
Total,			1	0	0	4	0	0	3	0	2					
Grand Total,				1	1	5	5	5	8	6	10	10	9	27	16	5

without waiting to see whether it be foul or fair, returning to his bat if the umpire decides it to be foul. In striking, some batsmen swing the bat and others merely push it against the ball. Usually the striker steps forward just as he hits, to give more force to his stroke.

The Base Runner is usually aided by the advice of a "coach," one of the men on his own side, who must

stand outside the 50 foot line (see diagram.) When running for a base a good player often finishes by throwing himself at full length, and sliding toward it, either feet-foremost or head-foremost, thus avoiding the touch of the baseman. Skillful base runners have signals by which they inform the batsman when they are going to "steal" a base, thus enabling him to hit to better advantage.

For instance, if a runner on First Base tries to steal Second Base, the Second Baseman will run to protect his base, leaving the field open, and a hit between the two bases will be a good one. Much of the success of the game depends on skillful base-running.

Score. The principal duty of the Scorers, of which there are generally two,—one for each side,—is to keep

record of all the runs and outs as they occur, so as to be able to tell at any time the state of the game. They usually do still more than this, keeping a complete record of the progress of the game, as will be shown below. The score is kept in a blank book prepared for the purpose, of which there are various forms. One page of one of them is represented below. It will be seen that the names

YAL

No.		P	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Camp	SS	S-A 1		+		+		+	F-3 3				3	3	'''	2
2	Platt	8	L-H 2		+		+		T-H 1		P-A 1			0	3	'''	2
3	Hopkins	1	B-B		S-A 2		T-B 2		S-A 2		+			1	2	'''	5
4	Badger	2	L-H 3		B-A 3		B-A 3				+			0	1	'''	5
5	Smith	C	S-A 1		+	B-A	L-C 1		F-1 3		S-A 2			0	1	'''	6
6	Kalcox	rf	S-A 2			L-C 1		P-A 2		+	S-A 3			1	1	'''	2
7	Jones	P.	T-S 2			F-2 2		+		+				1	3	'''	4
8	Hubbard	cf				A 3		B-A 3		B-A 1					0	2	'''
9	H. Hopkins	lf			P-A 1		F-5 1		+	S-A 2				1	1	'''	1
Total,			0	0	1	0	1	0	2	2	1						
Grand Total,			0		1	1	2	2	4	6	7			7	15	27	14
Scorers,			Yale,														

of the players, in the order in which they come to the bat are arranged in the first column. Opposite them, in the second, are abbreviations showing their positions. These differ with different Scorers, but those given below are Catcher, H; Pitcher, P; 1st baseman, A; 2d baseman, B; 3d baseman, C; Short-stop, S; Right fielder, R; Left fielder, L; Center fielder, M. Each of the next ten col-

umns is devoted to the runs and outs of an inning. In the other columns, in order, are recorded the total runs of each player, his base hits, the men he has put out, the men he assisted to put out (called "assists"), and his errors. As soon as the first Batsman leaves the Home-plate, the Scorer's work begins. If the Batsman is put out the Scorer writes in the first inning-column, opposite the player's

name, what looks like a fraction. Below the line is the number of the out (in this case, 1). Above is an abbreviation telling how he was put out. If he was put out by one of the players throwing the ball to a baseman, the letters denoting those players are used, separated by a dash; thus, P—B means that the Pitcher threw the ball to the 2d baseman. K means "struck out"; f., a fly catch; l. f., a foul fly; and b. b., first base taken on called balls. If, instead of going out, the Striker makes a base, he must have made a base hit, or someone, on the opposite side, made an error. If the former, the mark + is put down for a single base, ± for a two-base hit, or ≡ for a three-base hit. If the latter, a dot is put opposite the erring player's name in the error column on the other page. When a player scores, a dot is put opposite his name in the inning column. At the close of the game the total runs, base hits, put-outs, and assists are summed up from the score and entered in their respective columns. To sum up the *put-outs*, the number of times a man's letter appears, after a dash, is entered in the put-out column on the opposite page, for if R—B for instance appears opposite a man's name, that man was put out of course by the Second Baseman on the opposite side. The total number of put-outs for each side in an even nine-inning game is 27, and if they foot up more or less, there has been some mistake. The "assists" are summed up by treating, in like manner, the letters before the dashes. The assists need not number 27 altogether, for some men are put out without assistance, as when a fly is caught. When the score is published only the columns that are lettered at the top are given. Often two columns of base hits are entered; one of "base hits" simply, the other of "totals." In the former each hit is counted as one, whether for one or more bases; in the latter

a two-base hit is counted as 2, and a three-base hit as 3. This is all that a young scorer will care to do, but the National League rules require still more. When the score is announced to the public, as by printing it in a newspaper, of course only final figures are given. The standard method is to give the players' names in one column, and then in successive columns the number of times at bat, runs, base hits, sacrifice hits, put-outs, assists, and errors. This is followed by a summary giving the score in each inning, and a large number of particulars, such as bases stolen, home-runs, double and triple plays, called balls, wild pitches, etc. What are called the batting and fielding percentages of the players are often calculated at the end of a series of games. The former is the percentage of base hits in the total number of times at the bat; the latter the percentage of "chances accepted" in the total number of "chances offered." The chances offered to a fielder are found by adding his put-outs, assists, and errors; the chances accepted, by subtracting the errors from this sum. Thus, if a player has put out 25 men, assisted to put out 18, and made 9 errors, he has had 52 chances, of which he has accepted 43, and his fielding percentage is $\frac{43}{52} \times 100$, or nearly 83 per cent.

The proper scoring of errors is very difficult, especially as there the scorer has no time to wait and think. Good scorers often differ as to whether a base has been gained by a hit or an error, and their scores would therefore read differently in this respect. The rules given below contain some directions on this point. To be able to take the score of a ball game properly adds much to its enjoyment, and spectators often amuse themselves in this way. The score given above is that of a game between the Yale and Harvard university nines, and from it may be read a very good account of the

game. The reader will see that the first Harvard player made a run, though not on a base hit. The second struck a ball to the second baseman, who threw it to first base, putting him out; the third struck to third base with a like result, and the fourth struck to the first baseman, who picked up the ball and made the third out, ending the inning.

Rules of the Game. The rules given below are substantially those adopted by the National League and the American Association of Professional Base Ball Clubs. Those parts which refer to matters of discipline are omitted. Many of the rules apply to match games between organized clubs, and therefore do not apply to cases where sides are chosen just before the game, but it can be seen at a glance which rules thus apply.

THE BALL GROUND.

RULE 1.—The Ground must be an inclosed field, sufficient in size to enable each player to play in his position as required by these rules.

RULE 2.—To lay off the lines governing the positions and the play of the game known as Base Ball, proceed as follows:

From a point, A, within the grounds, project a right line out into the field, and at a point B, 154 feet from point A, lay off lines B C and B D at right angles to the line A B; then, with B as center and 63.63945 feet as radius, describe arcs cutting the lines B A at F and B C at B G D at H and B E at I. Draw lines F G, G E, E H and H F, and said lines will be the containing lines of the Diamond or infield.

THE CATCHER'S LINES.

RULE 3.—With F as center and 90 feet radius, describe an arc cutting line F A at L, and draw lines L M and L O at right angles to F A; and continue same out from F A not less than 90 feet.

THE FOUL LINE.

RULE 4.—From the intersection point, F, continue the straight lines

F G and F H until they intersect with the lines L M and L O, and then from the points G and H in the opposite direction until they reach the boundary lines of the grounds.

THE PLAYERS' LINES.

RULE 5.—With F as center and 50 feet radius, describe arcs cutting lines F O, F M at P and Q; then, with F as center again and 75 feet radius, describe arcs cutting F G and F H at R and S; then from the points P, Q, R and S draw lines at right angles to the lines F O, F M, F G and F H, and continue same until they intersect at the points T and W.

THE CAPTAIN AND COACHER'S LINE.

RULE 6.—With R and S as centers and 15 feet radius, describe arcs cutting lines R W and S T at X and Y, and from the points X and Y draw lines parallel with lines F H and F G, and continue same out to the boundary lines of the ground.

THE THREE-FOOT LINE.

RULE 7.—With F as center and 45 feet radius, describe an arc cutting line F G at 1, and from 1 out to the distance of 3 feet draw a line at right angles to F G, and marked point 2; then from point 2, draw a line parallel with the line F G to a point 3 feet beyond the point G, and marked 3; then from the point 3 draw a line at right angles to line 2, 3, back to and intersecting with line F G, and from thence back along line G F to point 1.

THE PITCHER'S PLATE.

RULE 8.—With point F as center and 60.5 as feet radius, describe an arc cutting the line F B at a point 4, and draw a line 5, 6, passing through point 4 and extending 12 inches on either side of line F B; then with line 5, 6, as a side, describe a parallelogram 24 inches by 6 inches.

THE BASES.

RULE 9.—Within the angle F, describe a square the sides of which shall be 12 inches, two of its sides lying upon the lines F G and F H,

and within the angles G and H describe squares the sides of which shall be 15 inches, the two outer sides of said square lying upon the lines F G and G I and F H and H I, and at the angle E describe a square whose sides shall be 15 inches and so described that its sides shall be parallel with G I and I H and its center immediately over the angular point E.

THE BATSMAN'S LINE.

RULE 10.—On either side of the line A F B describe two parallelograms 6 feet long and 4 feet wide (marked 8 and 9), their length being parallel with the line A F B, their distance apart being 6 inches added to each end of the length of the diagonal of the square within the angle F, and the center of the length being upon said diagonal.

RULE 11.—The Home Base at F and the Pitcher's Plate at 4 must be of whitened rubber, and so fixed in the ground as to be even with the surface.

RULE 12.—The First Base at G, the Second Base at E, and the Third Base at H must be of white canvas bags, filled with soft material and securely fastened in their positions described in Rule 9.

RULE 13.—The lines described in Rules 3, 4, 5, 6, 7 and 10 must be marked with lime, chalk, or other suitable material, so as to be distinctly seen by the umpire.

THE BALL.

RULE 14. SECTION 1.—Must not weigh less than five nor more than five and one-quarter ounces avoirdupois, and it must measure not less than nine nor more than nine and one-quarter inches in circumference.

SEC. 2. For each championship game two regulation balls shall be furnished by the home club to the umpire for use. When the ball in play is batted to foul ground and out of sight of the umpire, the other ball shall be immediately brought into play. As often as one of the

two in use shall be lost a new one must be substituted.

THE BAT.

RULE 15.—Must be entirely of hard wood, except that the handle may be wound with twine or a granulated substance supplied, not to exceed eighteen inches from the end.

It must be round, and it must not exceed two and three-quarter inches in diameter in the thickest part, nor exceed forty-two inches in length.

THE PLAYERS AND THEIR POSITIONS.

RULE 16.—The players of each club in a game shall be nine in number, one of whom shall act as captain, and in no case shall less than nine men be allowed to play on each side.

RULE 17.—The players' positions shall be such as may be assigned them by their captain, except that the pitcher, while in the act of delivering the ball to the bat, must take the position as defined in Rules 8 and 29.

RULE 18.—Players in uniform shall not be permitted to occupy seats *on the stands*, or to stand among the spectators.

RULE 19. SECTION 1.—No player shall attach anything to the sole or heel of his shoes other than the ordinary base ball shoe plate.

SEC. 2. The catcher and first baseman are permitted to wear a glove or mitt of any size, shape, or weight. All other players are restricted to the use of a glove or mitt weighing not over ten ounces, and measuring in circumference, around the palm of the hand, not over fourteen inches.

PLAYERS' BENCHES.

RULE 20.—The players' benches must be furnished by the home club and placed upon a portion of the ground outside of and not nearer than 25 feet to the players' lines. One such bench must be for the exclusive use of the visiting club, and one for the exclusive use of the home club.

THE GAME.

RULE 21. SECTION 1.—Every championship game must be commenced not later than two hours before sunset.

SEC. 2. A game shall consist of nine innings to each contesting nine, except that

(a.) If the side first at bat scores less runs in nine innings than the other side has scored in eight innings, the game shall then terminate.

(b.) If the side last at bat in the ninth inning scores the winning run before the third man is out, the game shall terminate.

A TIE GAME.

RULE 22.—If the score be a tie at the end of the nine innings, play shall be continued until one side has scored more runs than the other in an equal number of innings, provided, that the side last at bat scores the winning run before the third man is out, the game shall terminate.

A DRAWN GAME.

RULE 23.—A drawn game shall be declared by the umpire when he terminates a game on account of darkness or rain, after five equal innings have been played, if the score at the time is equal on the last even innings played; except when the side that went second to bat is then at the bat, and has scored the same number of runs as the other side, in which case the umpire shall declare the game drawn without regard to the score of the last equal innings.

A CALLED GAME.

RULE 24.—If the umpire calls "Game" on account of darkness or rain at any time after five innings have been completed, the score shall be that of the last equal innings played, except, that the side second at bat shall have scored one or more runs than the side first at bat, in which case the score of the game shall be the total number of runs made.

A FORFEITED GAME.

RULE 25.—A forfeited game shall be declared by the umpire in favor

of the club not in fault, at the request of such club, in the following cases :

SECTION 1. If the nine of a club fail to appear upon the field, or being upon the field, fail to begin the game within five minutes after the umpire has called "Play" at the hour appointed for the beginning of the game, unless such delay in appearing, or in commencing the game, be unavoidable.

SEC. 2. If, after the game has begun, one side refuses or fails to continue playing, unless such game has been suspended or terminated by the umpire.

SEC. 3. If, after play has been suspended by the umpire, one side fails to resume playing within one minute after the umpire has called "Play."

SEC. 4. If a team resorts to dilatory movements to delay the game.

SEC. 5. If, in the opinion of the umpire, any one of the rules of the games is willfully violated.

SEC. 6. If, after ordering the removal of a player, as authorized by the Rules, said order is not obeyed within one minute.

SEC. 7. If, because of removal of players from the game by the umpire, there be less than nine players in either team.

SEC. 8. If, when two games are scheduled to be played on the same afternoon, the second game be not commenced within ten minutes of the time of completion of the first game. The umpire of the first game shall be the timekeeper.

NO GAME.

RULE 26.—"No game" shall be declared by the umpire if he shall terminate play on account of rain or darkness before five innings on each side are completed. Except in a case when the game is called, and the club second at bat shall have more runs at end of its fourth innings than the club first at bat has made in its five completed innings; in such case the umpire shall award the game to the club

having made the greatest number of runs.

SUBSTITUTES.

RULE 27. SECTION 1.—In every championship game each side shall be required to have present on the field, in uniform, a sufficient number of substitute players to carry out the provision which requires that not less than nine players shall occupy the field in any innings of the game.

SEC. 2. Any such player may be substituted at any time by either club, but a player thereby retired shall not thereafter participate in the game.

SEC. 3. The base-runner shall not have a substitute run for him except by the consent of the captains of the contesting teams.

CHOICE OF INNINGS—CONDITION OF GROUND.

RULE 28.—The choice of innings shall be given to the captain of the home club, who shall also be the sole judge of the fitness of the ground for beginning a game after rain, but, after play has been called by the umpire, he alone shall be the judge as to the fitness of the ground for resuming play after the game has been suspended on account of rain.

THE PITCHER'S POSITION.

RULE 29.—The pitcher shall take his position facing the batsman with both feet square on the ground, and in front of the pitcher's plate; but in the act of delivering the ball to the bat, one foot must be in contact with the pitcher's plate, defined in Rule 8. He shall not raise either foot, unless in the act of delivering the ball to the bat, nor make more than one step in *such delivery*.

A FAIRLY DELIVERED BALL.

RULE 30.—A Fairly Delivered Ball to the bat is a ball pitched or thrown to the bat by the pitcher while standing in his position and facing the batsman, the ball so delivered to pass over any portion of the home base not lower than the batsman's knee nor higher than his shoulder.

AN UNFAIRLY DELIVERED BALL.

RULE 31.—An Unfairly Delivered Ball is a ball delivered by the pitcher, as in Rule 30, except that the ball does not pass over any portion of the home base, or does pass over the home base, above the batsman's shoulder or below the *line of his knee*.

BALKING.

RULE 32.—A Balk shall be :

SECTION 1. Any motion made by the pitcher to deliver the ball to the bat without delivering it.

SEC. 2. Any delivery of the ball to the bat while his (pivot) foot is not in contact with the pitcher's plate, as defined in Rule 29.

SEC. 3. Any motion in delivering the ball to the bat by the pitcher while not in the position defined in Rule 29.

SEC. 4. The holding of the ball by the pitcher so long as, in the opinion of the umpire, to delay the game unnecessarily.

SEC. 5. Standing in position *and making any motion* to pitch without having the ball in his possession, except in the case of a "block-ball," as provided by Rule 35, section 2.

When the pitcher feigns to throw the ball to a base he must resume the above position and pause momentarily before delivering the ball to the bat.

If the pitcher fails to comply with the requirements of this rule the umpire must call "A balk."

SEC. 6. *The making of any motion the pitcher habitually makes in his method of delivery, without his immediately delivering the ball to the bat.*

SEC. 7. *If the pitcher feigns to throw the ball to a base and does not resume his legal position and pause momentarily before delivering the ball to the bat.*

DEAD BALLS.

RULE 33.—A Dead Ball is a ball delivered to the bat by the pitcher that touches any part of the batsman's person or clothing while

standing in his position without being struck at, or that touches any part of the umpire's person or clothing while he is standing on foul ground without first passing the catcher.

RULE 34.—In case of a foul strike, foul hit ball not legally caught out, dead ball, or base-runner put out for being struck by a fair-hit ball, the ball shall not be considered in play until it is held by the pitcher standing in his position and the umpire shall have called play.

BLOCK BALLS.

RULE 35. SECTION 1.—A Block is a batted or thrown ball that is touched, stopped, or handled by any person not engaged in the game.

SEC. 2. Whenever a block occurs the umpire shall declare it and the base-runners may run the bases without being put out until the ball has been returned to and held by the pitcher standing in his position.

SEC. 3. In the case of a block, if a person not engaged in the game should retain possession of the ball, or throw or kick it beyond the reach of the fielders, the umpire should call "Time" and require each base-runner to stop at the last base touched by him until the ball be returned to the pitcher standing in his position and the umpire shall have called "Play."

THE BATSMAN'S POSITION—ORDER OF BATTING.

RULE 36.—The batsmen must take their position within the batsman's lines, as defined in Rule 10, in the order in which they are named in the batting order, which batting order must be submitted by the captains of the opposing teams to the umpire before the game, and this batting order must be followed except in the case of a substitute player, in which case the substitute must take the place of the original player in the batting order. After the first inning the first striker in each inning shall be the batsman

whose name follows that of the last man who has completed his turn—time at bat—in the preceding inning.

RULE 37. SECTION 1.—When their side goes to the bat the players must immediately return to the players' bench, as defined in Rule 20, and remain there until the side is put out, except when called to the bat or they become *coachers* or substitute base-runners; provided, that the captain or one player only, except that if two or more base-runners are occupying the bases then the captain and one player, or two players, may occupy the space between the player's lines and the captain's lines to coach base-runners.

SEC. 2. No player of the side "at bat," except when batsman, shall occupy any portion of the space within the catcher's lines, as defined in Rule 3. The triangular space behind the home base is reserved for the exclusive use of umpire, catcher, and batsman, and the umpire must prohibit any player of the side "at bat" from crossing the same at any time while the ball is in the hands of, or passing between, the pitcher and catcher, while standing in their positions.

SEC. 3. The players of the side "at bat" must occupy the portion of the field allotted them, but must speedily vacate any portion thereof that may be in the way of the ball, or any fielder attempting to catch or field it.

THE BATTING RULES.

RULE 38. SECTION 1.—A Fair Hit is a ball batted by the batsman—while he is standing within the lines of his position—that first touches "fair" ground, or the person of a player, or the umpire, while standing on fair ground, and then settles on fair ground before passing the line of first or third base.

SEC. 2. A Foul Hit is a similarly batted ball that first touches "foul" ground, or the person of a player, or the umpire while standing on "foul" ground.

SEC. 3. Should such "fair hit" ball bound or roll to foul ground, before passing the line of first or third base, and settle on foul ground, it shall be declared by the umpire a foul ball.

SEC. 4. Should such "foul hit" ball bound or roll to fair ground and settle there before passing the line of first or third base, it shall be declared by the umpire a fair ball.

RULE 39.—A foul tip is a ball batted by the batsman while standing within the lines of his position that goes foul sharp from the bat to the catcher's hands.

RULE 40.—A bunt hit is a ball delivered by the pitcher to the batsman who, while standing within the lines of his position, makes a deliberate attempt to hit the ball so slowly within the infield that it cannot be fielded in time to retire the batsman. If such a "bunt hit" goes to foul ground a strike shall be called by the umpire.

BALLS BATTED OUTSIDE THE GROUND.

RULE 41.—When a batted ball passes outside the grounds, the umpire shall decide it Fair should it disappear within, or Foul should it disappear outside of the range of the foul lines, and Rule 38 is to be construed accordingly.

RULE 42.—A fair batted ball that goes over the fence shall entitle the batsman to a home run, except, that should it go over the fence at a less distance than two hundred and thirty-five (235) feet from the home base, when he shall be entitled to two bases only, and a distinctive line shall be marked on the fence at this point.

STRIKES.

RULE 43.—A Strike is:

SECTION 1. A ball struck at by the batsman without its touching his bat; or,

SEC. 2. A fair ball legally delivered by the pitcher, but not struck at by the batsman.

SEC. 3. Any intentional effort to

hit the ball to foul ground, also in the case of a "bunt hit," which sends the ball to foul ground, either directly, or by bounding or rolling from fair ground to foul ground, and which settles on foul ground.

SEC. 4. A ball struck at, if the ball touches any part of the batsman's person.

SEC. 5. A ball tipped by the batsman, and caught by the catcher, within ten feet from home base.

RULE 44.—A Foul Strike is a ball batted by the batsman when any part of his person is upon ground outside the lines of the batsman's position.

THE BATSMAN IS OUT.

RULE 45.—The Batsman is Out:

SECTION 1. If he fails to take his position at the bat in his order of batting, unless the error be discovered and the proper batsman takes his position before a time "at bat" is recorded, and, in such case, the balls and strikes called must be counted in the time "at bat" of the proper batsman, and only the proper batsman shall be declared out, *and no runs shall be scored or bases run because of any act of the improper batsman*, provided, this rule shall not take effect unless the out is declared before the ball is delivered to the succeeding batsman. *Should batsman declared out by this rule be sufficient to retire the side, the proper batsman the next innings is the player who would have come to bat had the players been out by ordinary play.*

SEC. 2. If he fails to take his position within one minute after the umpire has called for the batsman.

SEC. 3. If he makes a foul hit other than a foul tip, as defined in Rule 39, and the ball be momentarily held by a fielder before touching the ground; provided, it be not caught in a fielder's hat or cap, or touched by some object other than a fielder before being caught.

SEC. 4. If he makes a foul strike.

SEC. 5. If he attempts to hinder

the catcher from fielding or throwing the ball by stepping outside the lines of his position, or otherwise obstructing or interfering with the player.

SEC. 6. If, while the first base be occupied by a base-runner, three strikes be called on him by the umpire, except when two men are already out.

SEC. 7. If, after two strikes have been called, the batsman obviously attempts to make a foul hit, as in Rule 43, section 3.

SEC. 8. If, while attempting a third strike, the ball touches any part of the batsman's person, in which case base-runners occupying bases shall return as prescribed in Rule 49, section 5.

SEC. 9. If he hits a fly ball that can be handled by an infielder while first and second bases are occupied, or first, second and third with only one out. In such case the umpire shall, as soon as the ball is hit, declare infield or outfield hit.

SEC. 10. If the third strike is called in accordance with section 4, Rule 43.

SEC. 11. The moment a batsman is declared out by the umpire, he (the umpire) shall call for the batsman next in order to leave his seat on the bench and take his position at the bat, and such player of the batting side shall not leave his seat on the bench until so called to bat, except as provided by Rule 37, section 1, and Rule 52.

BASE-RUNNING RULES.

RULE 46.—WHEN THE BATSMAN BECOMES A BASE-RUNNER.

The Batsman becomes a Base-runner:

SECTION 1. Instantly after he makes a fair hit.

SEC. 2. Instantly after four balls have been called by the umpire.

SEC. 3. Instantly after three strikes have been declared by the umpire.

SEC. 4. If, while he be batsman, without making any attempt to

strike at the ball, his person or clothing be hit by a ball from the pitcher unless, in the opinion of the umpire, he plainly avoids making any effort to get out of the way of the ball from the pitcher, and thereby permits himself to be so hit.

SEC. 5. Instantly after an illegal delivery of a ball by the pitcher.

An illegal delivery of the ball is made if the pitcher's pivot foot be not in contact with the rubber plate at the time of the delivery of the ball, or if he takes more than one step in delivery, or if, after feigning to throw to a base, he fails to pause momentarily before delivering the ball to the bat.

BASES TO BE TOUCHED.

RULE 47.—The base-runner must touch each base in regular order, viz., first, second, third and home bases, and when obliged to return (except on a foul hit) must retouch the base or bases in reverse order. He shall only be considered as holding a base after touching it, and shall then be entitled to hold such base until he has legally touched the next base in order or has been legally forced to vacate it for a succeeding base-runner. However, no base-runner shall score a run to count in the game until the base-runner preceding him in the batting list (provided there has been such a base-runner who has not been put out in that inning) shall have first touched home base without being put out.

ENTITLED TO BASES.

RULE 48.—The base-runner shall be entitled, without being put out, to take the base in the following cases:

SECTION 1. If, while he was batsman, the umpire called four balls.

SEC. 2. If the umpire awards a succeeding batsman a base on four balls, or for being hit with a pitched ball, or in case of an illegal delivery—as in Rule 46, section 5—and the base-runner is thereby forced to vacate the base held by him.

SEC. 3. If the umpire calls a "Balk."

SEC. 4. If a ball, delivered by the pitcher, pass the catcher, and touch the umpire, or any fence or building within ninety feet of the home base.

SEC. 5. If, upon a fair hit, the ball strikes the person or clothing of the umpire on fair ground.

SEC. 6. If he be prevented from making a base by the obstruction of an adversary, unless the latter be a fielder having the ball in his hand ready to meet the base-runner.

SEC. 7. If the fielder stop or catch a batted ball with his hat or any part of his uniform except his gloved hand.

RETURNING TO BASES.

RULE 49.—The base-runner shall return to his base, and shall be entitled to so return without being put out :

SECTION 1. If the umpire declares a foul tip (as defined in Rule 39), or any other foul hit not legally caught by a fielder.

SEC. 2. If the umpire declares a foul strike.

SEC. 3. If the umpire declares a dead ball, unless it be also the fourth unfair ball and he be thereby forced to take the next base, as provided in Rule 48, section 2.

SEC. 4. If the person or clothing of the umpire interferes with the catcher, or he is struck by a ball thrown by the catcher to intercept a base-runner.

SEC. 5. The base-runner shall return to his base if, while attempting a strike, the ball touches any part of the batsman's person.

WHEN BASE-RUNNERS ARE OUT.

RULE 50.—The Base-runner is Out :

SECTION 1. If, after three strikes have been declared against him while batsman and the catcher fail to catch the third strike ball, he plainly attempts to hinder the catcher from fielding the ball.

SEC. 2. If, having made a fair

hit while batsman, such fair hit ball be momentarily held by a fielder before touching the ground, or any object other than a fielder; PROVIDED, it be not caught in a fielder's hat or cap.

SEC. 3. If, when the umpire has declared three strikes on him while batsman, the third strike ball be momentarily held by a fielder before touching the ground; PROVIDED, it be not caught in a fielder's hat or cap, or touch some object other than a fielder before being caught.

SEC. 4. If, after three strikes or a fair hit, he be touched with the ball in the hand of a fielder before he shall have touched first base.

SEC. 5. If, after three strikes or a fair hit, the ball be securely held by a fielder while touching first base with any part of his person before such base-runner touches first base.

SEC. 6. If, in running the last half of the distance from home base to first base, while the ball is being fielded to first base, he runs outside the three-foot lines, as defined in Rule 7, unless to avoid a fielder attempting to field a batted ball.

SEC. 7. If, in running from first to second base, from second to third base, or from third to home base, he runs more than three feet from a direct line between such bases to avoid being touched by the ball in the hands of a fielder; but in case a fielder be occupying the base-runner's proper path in attempting to field a batted ball, then the base-runner shall run out of the path, and behind said fielder, and shall not be declared out for so doing.

SEC. 8. If he fails to avoid a fielder attempting to field a batted ball, in the manner described in sections 6 and 7 of this rule, or if he, in any way, obstructs a fielder attempting to field a batted ball, or intentionally interferes with a thrown ball; PROVIDED, that if two or more fielders attempt to field a batted ball, and the base-runner comes in

contact with one or more of them, the umpire shall determine which fielder is entitled to the benefit of this rule, and shall not decide the base-runner out for coming in contact with any other fielder.

SEC. 9. If, at any time while the ball is in play, he be touched by the ball in the hands of a fielder, unless some part of his person is touching a base he is entitled to occupy; PROVIDED, the ball be held by the fielder after touching him.

SEC. 10. *The base-runner in running to first base may overrun said base, without being put out for being off said base, after first touching it, provided he returns at once and retouches the base, after which he may be put out as at any other base. If, in overrunning first base, he also attempts to run to second base, or after passing the base he turns to his left from the foul line, he shall forfeit such exemption from being put out.*

SEC. 11. If, when a fair or foul hit ball (other than a foul tip as referred to in Rule 39) is legally caught by a fielder, such ball is legally held by a fielder on the base occupied by the base-runner when such ball was struck (or the base-runner be touched with the ball in the hands of a fielder), before he retouches said base after such fair or foul hit call was so caught; PROVIDED, that the base-runner shall not be out, in such case, if, after the ball was legally caught as above, it be delivered to the bat by the pitcher before the fielder holds it on said base, or touches the base-runner with it; but if the base-runner, in attempting to reach a base, detaches it before being touched or forced out, he shall be declared safe.

SEC. 12. If, when a batsman becomes a base-runner, the first base, or the first and second bases, or the first, second and third bases, be occupied, any base-runner so occupying a base shall cease to be

entitled to hold it, until any following base-runner is put out, and may be put out at the next base, or by being touched by the ball in the hands of a fielder in the same manner as in running to first base at any time before any following base-runner is put out.

SEC. 13. If a fair hit ball strike him before touching the fielder, and, in such case, no base shall be run unless forced by the batsman becoming a base-runner, and no run shall be scored or any other base-runner put out.

SEC. 14. If, when running to a base, or forced to return to a base, he fail to touch the intervening base, or bases, if any, in the order prescribed in Rule 47, he may be put out at the base he fails to touch, or being touched by the ball in the hands of a fielder in the same manner as in running to first base; PROVIDED, that the base-runner shall not be out in such case if the ball be delivered to the bat by the pitcher before the fielder holds it on said base, or touches the base-runner with it.

SEC. 15. If, when the umpire calls "Play," after any suspension of a game, he fails to return to and touch the base he occupied when "Time" was called before touching the next base; PROVIDED, the base-runner shall not be out, in such case, if the ball be delivered to the bat by the pitcher before the fielder holds it on said base or touches the base-runner with it.

WHEN BATSMAN OR BASE-RUNNER IS OUT.

RULE 51.—The umpire shall declare the batsman or base-runner out, without waiting for an appeal for such decision, in all cases where such player is put out in accordance with these rules, except as provided in Rule 50, sections 10 and 14.

COACHING RULES.

RULE 52.—The coacher shall be restricted to coaching the base-runner only, and shall not be allowed

to address any remarks except to the base-runner, and then only in words of necessary direction; and shall not use language which will in any manner refer to, or reflect upon a player of the opposing club, the umpire or the spectators, and not more than one coacher, who may be a player participating in the game, or any other player under contract to it, in the uniform of either club, shall be allowed at any one time, except, that if base-runners are occupying two or more of the bases, then the captain and one player, or two players in the uniform of either club, may occupy the space between the players' lines and the captains' lines to coach base-runners. To enforce the above the captain of the opposite side may call the attention of the umpire to the offense, and, upon a repetition of the same, the offending player shall be debarred from further participation in the game, and shall leave the playing field forthwith.

THE SCORING OF RUNS.

RULE 53.—One run shall be scored every time a base-runner, after having legally touched the first three bases, shall touch the home base before three men are put out. (Exception)—If the third man is forced out, or is put out before reaching first base, a run shall not be scored.

GENERAL DEFINITIONS.

"Play" is the order of the umpire to begin the game, or to resume play after its suspension.

"Time" is the order of the umpire to suspend play. Such suspension must not extend beyond the day of the game.

"Game" is the announcement by the umpire that the game is terminated.

An "Inning" is the term at bat of the nine players representing a club in a game, and is completed when three of such players have been put out, as provided in these rules.

A "Time at Bat" is the term at bat of a batsman. It begins when

he takes his position and continues until he is put out or becomes a base-runner; except when, because of being hit by a pitched ball, or in case of an illegal delivery by the pitcher, or in case of a sacrifice hit purposely made to the infield which, not being a base-hit, advances a base-runner without resulting in a put-out, except to the batsman, as in Rule 45.

"Legal" or "Legally" signifies as required by these rules.

SCORING RULES.

BATTING.

No time at bat shall be scored if the batsman be hit by a pitched ball while standing in his position, and after trying to avoid being so hit, or in case of the pitcher's illegal delivery of the ball to the bat which gives the batsman his base, or when he intentionally hits the ball to the field, purposely to be put out, or if he is given first base on called balls.

A base-hit should be scored in the following cases:

When the ball from the bat strikes the ground within the foul lines and out of reach of the fielders.

When a hit ball is partially or wholly stopped by a fielder in motion, but such player cannot recover himself in time to handle the ball before the striker reaches first base.

When a ball is hit *with such force* to an infielder that he cannot handle it in time to put out the batsman. (In case of doubt over this class of hits, score a base-hit and exempt the fielder from the charge of an error.)

When a ball is hit so slowly toward a fielder that he cannot handle it in time to put out the batsman.

That in all cases where a base-runner is retired by being hit by a batted ball, the batsman should be credited with a base-hit.

When a batted ball hits the person or clothing of the umpire. *In no case shall a base-hit be scored when a base-runner has been forced out by the play.*

FIELDING.

Where a batsman is given out by the umpire for a foul strike, or where the batsman fails to bat in proper order, the put-out shall be scored to the catcher. *In all cases of "out" for interference, running out of line, or infield fly dropped, the "out" should be credited to the player who would have made the play but for the action of the base-runner or batsman.*

An assist should be given to each player who handles the ball in assisting a put-out or other play of the kind.

And generally an assist should be given to each player who handles or assists in any manner in handling the ball from the time it leaves the bat until it reaches the player who makes the put-out, or in case of a thrown ball, to each player who throws or handles it cleanly and in such a way that a put-out results, or would result if no error were made by the receiver.

ERRORS.

An error shall be given for each misplay which allows the striker or base-runner to make one or more bases when perfect play would have insured his being put out, except that "wild pitches," "bases on balls," bases on the batsman being struck by a "pitched ball," or in cases of illegal pitched balls, balks and passed balls, *all of which comprise battery errors*, shall not be included in said column.

One Old Cat, a kind of base ball played by any number of persons. The Home base is the only base, and the positions of the players are Batsman, Catcher, Pitcher, and any number of fielders, called First Field, Second Field, and so on. The striker keeps his place till he is put out. He is out if a fair fly or a foul bound is caught, all balls being fair that strike in front of the base, or if the Catcher catch, the ball after his third strike. If the ball is not caught at the third strike he has three more,

and no strikes are counted except those actually made. When the striker is put out he takes the place of the lowest fielder. Each fielder then rises one step in rank, and First Field becomes Pitcher, while Pitcher takes the Catcher's place, and Catcher goes to the bat. Sometimes, when a fair ball is caught, the fielder who makes the catch is allowed to go to the bat at once. The Batsman takes the lowest place as before, but only those lower than the successful fielder rise in rank.

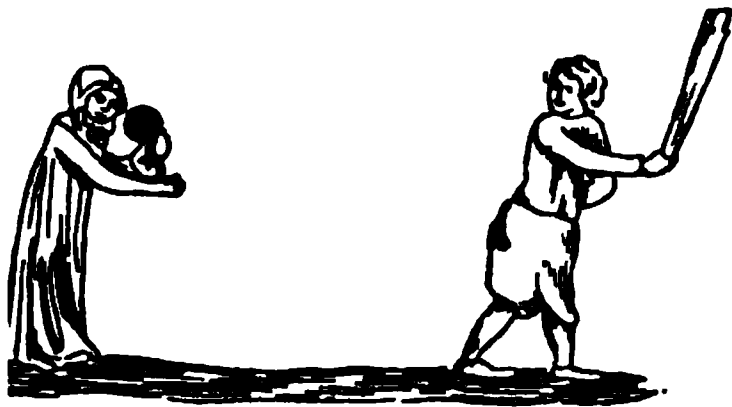
One Old Cat is sometimes varied by having two bases, Home and First Base, and making the Batsman run to the latter and back when he strikes a fair ball. If he does so without being put out at Home, he scores a run. There is no First Baseman.

Two Old Cat. This differs from One Old Cat only in having two Batsmen, to whom the ball is pitched alternately, the Catcher for one acting as Pitcher for the other. The fielders are partly behind one Batsman and partly behind the other.

Single-Handed Base, a kind of Base Ball resembling One Old Cat, with a First Base, except that there is a First Baseman, who can put the striker out as in the regular game. No count is kept of runs; but if the Batsman reaches his base safely the Baseman goes to the bat, and the two thus alternate till one of them is put out. When there is an out, the players change positions as in One Old Cat, except the Baseman, who continues at his post, and alternates with the new Batsman.

History. Games of ball in which a feature is running from one base or goal to another have probably been played for a long time, and games of some sort in which a bat is used are still older (see CRICKET). The illustration, from an old manuscript, shows a game of "club ball" in the 14th century. In 1748 the family of the Prince of Wales are said to have played "Base Ball," and in 1798

Miss Austen in one of her novels speaks of a game of the same name as being played by girls. A game of "Base Ball" is still played in England, by little girls, in which the striker hits the ball with her hand, and then runs from one goal to another, while those on the opposite side strive to hit her with the ball by throwing it while she is between bases. Another English game of Base Ball, played by boys or men, is



Club Ball in the 14th Century.

called Rounders. It has been said many times that American Base Ball is derived from Rounders, but some writers deny this, and the only ground for the assertion seems to be the similarity of the games, which have, very likely, a common origin.

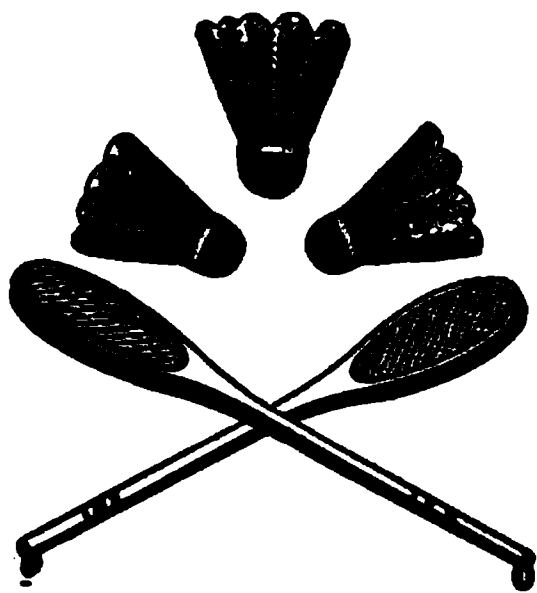
Similar games are favorites in other European countries. In *Deutsches Ballspiel* (German ball) the field is nearly square and the striker stands on one of the sides. There are but two bases, and the striker runs from one to the other and back. If the ball is thrown at him and hits him, while running, he is out. The last one out can call for three strikes, as in Rounders. The French "*Balle au Camp*" (Camp Ball) is also like Rounders, except that the ball is struck with the hand, no bat being used. The shape of the field (called the Camp) and the number of bases vary in different places. In a form of the same called *Balle Empoisonée* (Poisoned Ball), the base-runner may kick the ball out of his way, but must not touch it with his hands, it being considered "poisoned."

The first regular Base Ball club in the United States is believed

to have been the "Knickerbocker" of New York, formed in 1845. Others soon followed, a uniform set of rules was adopted by a convention of clubs in 1857, and in 1858 "The National Association of Base Ball Players" was organized. In 1859 a rule was passed forbidding paid players to take part in matches, but this was often broken, and in 1868 it was repealed. In 1871 the first association of paid or "professional" players was formed, and now there are several such. The old "National Association" is not now in existence, and the principal associations of amateur players are the various college associations. Base Ball is now widely known as the American national game, and it is the only outdoor game that is played almost exclusively in the United States. The principal difference between the present game and its earlier forms is that while at first the pitcher was compelled to pitch or toss the ball to the striker, as his name shows, he is now allowed to throw it. The result is that the ball is harder to hit and fewer runs are made. Formerly, in a match game, it was not unusual for each side to make thirty or forty runs.

BATTLEDORE AND SHUTTLECOCK, a game played by any number of persons. The implements are shown in the accompanying figures. The Shuttlecock is usually made of cork loaded with lead, or sometimes of rubber, and crowned with feathers. The Battledore is sometimes made entirely of wood, but better of parchment stretched over a wooden frame, and it is often strung with twine or catgut, like a lawn TENNIS racket. The object of the game is simply to prevent the Shuttlecock from falling to the ground by striking it from one player to another with the Battledore. The shuttlecock has in the air a spinning motion caused by the feathers. In whatever direction it is struck, it always turns so that the cork goes

foremost, for the same reason that a vane points toward the direction from which the wind is blowing. The Germans call this game *Federball* (Featherball). As they play it, he who lets the Shuttlecock fall loses a point, and when thirty points have been lost the game is ended; he who has lost fewest points being the winner. The French call the game *le volant* (The Flyer). The Chinese, who are very skillful players, strike the shuttlecock with the sole of their



Battledores and Shuttlecocks.

feet. Badminton, a game played also with Battledores and a Shuttlecock, is noticed at the end of the article on lawn TENNIS.

History. The game was played at least 500 years ago. In the 17th century it was a fashionable game. In a comedy printed in 1609 occur the words, "To play at shuttlecock methinks is the game now." The Battledore is named after a similar instrument once used for beating clothes in washing. The word (sometimes spelled Battledoor) is thought by some to be the Spanish *batallador*, a combatant, but it is more probably related to the words bat and beat. The Shuttlecock is so called because it is driven backward and forward like a shuttle in weaving. Some think it is for Shuttle *cock*, and some that it is called a cock on account of its feathers.

BATTLE GAME, THE. See FOX AND GEESE.

BEAN BAGS, a game with cloth

bags, partially filled with beans, played by any number of persons. After choosing sides, the players stand in two lines facing each other. Each line has a chair or table, at each end, on one of which are piled half the bean bags. At a signal, the player in each line nearest his pile of bags seizes them one by one and passes them along the line; as they reach the other end of the line they are placed on the chair or table at that end, and the side which first transfers all its bags wins the game. Each player must have hold of only one bag at a time, and must hold that in only one hand at a time, passing it from one hand to the other and from that to the next player in order. If a player pass a bag wrongly, or drop it, his side loses the game. There should be an umpire to decide all disputed questions. This game of bean bags is more amusing when it is played with bundles of clothes-pins loosely tied together, as it is difficult to hand the clothes-pins down the line without dropping some of them.

BELL AND HAMMER, a game played by any number of persons, with counters, dice, and five cards, which bear respectively the figures of a White Horse, an Inn, a Bell, a Hammer and a Bell and Hammer together. The dice bear not only numbers, but also blanks and the figures of a bell and hammer. One of the players is chosen as cashier, who distributes an equal number of counters to each. He then sells by auction, to the one who bids the highest number of counters, the five cards, separately. The counters thus paid are placed in the middle of the table to form the pool, to which each player pays four counters more. The players then throw the dice in order, the cashier first and then the others in any order he may choose, but the same order must be preserved during the game. If any one throw all blanks, each player must pay one counter to the holder of the White

Horse, but if with the blanks the Bell or Hammer, or both, be thrown, the holder of the corresponding card must pay one to the White Horse. When numbers are thrown with the Bell or Hammer the cashier pays their sum in counters from the pool to the holder of the corresponding card; when numbers and blanks are thrown, the cashier pays the amount of such numbers from the pool to the thrower. Where the sum of the numbers thrown exceeds the number of counters in the pool, nothing is

paid from the pool, but the player who would otherwise have received pay pays the excess to the holder of the Inn. After the Inn has begun thus to receive, if all blanks are thrown, the players do not pay, as before, but the White Horse pays one to the Inn. If Bell or Hammer, or both, be thrown with blanks after the Inn begins to receive, the holder of the corresponding card pays one to the Inn. The game is won by the player having the largest number of counters at the close of the game.



Bell and Hammer Implements.

The game ends when some player takes all the counters in the pool, and such player acts as cashier for the next game. Bell and Hammer is much played in Germany, where it is called *Glocke und Hammer* (Bell and Hammer) or *Schimmel* (Horse).

BEZIQUE, a game of CARDS played by two, three, or four persons, with as many EUCHRE packs as there are players. The two-handed game will be described first. The cards rank as follows: Ace, Ten, King, Queen, Knave, Nine, Eight, and Seven. The players cut for deal and the highest deals eight cards to each; three, two, and three at a time. The cards that are left are called the stock, and are placed where each player can reach them. The dealer turns up the top card of the stock as a trump and lays it near the stock. Should it be a seven, he scores ten. The non-dealer now leads any

card he chooses, and his opponent follows, but he is not obliged to follow suit nor to win the trick. The winner of the trick scores ten for every Ace and every Ten in the trick, and may also lay on the table in front of him any group of cards that is named in the list given below, scoring the proper number of points for it. This is called making a declaration, and the cards so laid down are said to be declared. They are still part of his hand, though they remain on the table, and he may play them like the others. After the declaration, if there is any (otherwise immediately after the trick is taken), the winner adds to his hand the top card of the stock, and his opponent takes the next one; thus each has eight cards as at first. The winner of the last trick leads, and the playing, declaring, and drawing go on till the stock is exhausted. After

this no more declarations may be made, and each player takes into his hand those of his cards that still lie on the table. In the subsequent play suit must be followed, and the second player in each trick must take it if he can. The winner of the last trick scores ten.

The cards are then dealt again and the game goes on as before, till one of the players has scored the winning number of points. This is agreed on before the game, but is usually 1000.

The groups of cards that may be declared, and the points that may be scored for each, are as follows :

Seven of trumps counts 10

[This card may be exchanged for the trump card, if the holder choose, instead of being laid on the table.]

A Common Marriage (King and Queen of any suit but trumps) counts 20

A Royal Marriage (King and Queen of trumps) counts 40

Bézique (Queen of Spades and Knave of Diamonds) counts 40

Double Bézique (two béziques) counts 500

Four Aces count 100

Four Kings " 80

Four Queens " 60

Four Knaves " 40

A Sequence (Ace, Ten, King, Queen, and Knave of trumps) counts 250

Players are not obliged to make a declaration if they do not wish to do so. The same card can be declared more than once if the second group so declared is of a different kind from the first. Thus, if a Bézique is lying on the table, a King of Spades may be laid down and married to the Queen that forms part of it, and afterward four Kings may be declared by putting down three more Kings, but a King or Queen can count in only one marriage, and an ace or face card in only one group of four ; a Double Bézique counts as a group of a different kind from a Bézique, and therefore may be

formed by adding one Bézique to another already declared. At least one card of a group must be laid on the table for the first time when it is declared ; thus, if four Kings and a Bézique lie already on the table, one of the Kings cannot be married to the Queen in the Bézique. So, also, cards may be added to a Royal Marriage to form a Sequence, but if a Sequence is declared first, the Royal Marriage it contains may not be declared afterward. Any number of groups may be declared at once when they are entirely separate, but not when one or more cards appear in more than one group. When the Seven of trumps is exchanged for the trump card as explained above, the latter is placed among those of the player's cards that are held up, and must not be declared till he has won another trick. Of course no card can be declared that has been played in a trick.

In playing, the beginner must think of two things ; the value of his cards in making declarations, and their power to take Aces and Tens. If the player has no declaration to make and cannot take an Ace nor a Ten by winning a trick, it is rather a disadvantage to him to win it. As suit is not followed, except at the end of the game, it is unsafe to lead an Ace or a Ten, as they will probably be trumped. Yet it is often better to do this than to play a King or Queen that has not yet been married. By carefully watching his opponent's play, especially that from the declared cards, a player may often judge correctly the strength of his hand.

Scoring the Aces and Tens is often left till the end of the hand, when each player, gathering up the tricks he has taken, reckons them all at once ; but it is simpler to score for them as they are taken. The score may be kept with pencil and paper, but score cards like the one in the illustration are commonly used, having three pointers, for tens, hundreds,

and thousands. In the figure the score marked is 3520.

RULES OF THE GAME.

1. If either player is dealt less than eight cards the number must be



Bézique Marker.

made up from the stock, or the non-dealer may call for a new deal, if he has not seen his hand.

2. If the dealer gives his adversary more than eight cards, the latter must not draw till he has played all but seven. If the dealer gives himself more than eight, the other may draw the surplus cards and place them on the stock.

3. If the dealer shows a card in dealing, the other player may call for a new deal.

4. If a player draw out of turn, his opponent may add twenty to his own score, or take twenty from that of the offender, unless he has drawn his own card before noticing the mistake.

5. If a player draw two cards at once, his opponent may look at their faces and give the offender whichever he pleases.

6. There is no penalty for showing the wrong card by mistake, or for leading out of turn, but, if the other player has not followed such a lead, he may correct it if he wishes.

7. Neither player may look at the tricks already played.

8. If a player revoke after the cards on the table have been gathered up, or if he refuse to take a card that is led, when he can do so, his opponent shall score all Aces and Tens in the last eight tricks.

9. A mistake in scoring, or an

omission to score, may be corrected at any time during the hand.

Three-Handed Bezique. Three EUCHRE-packs are used, and each one plays for himself. Triple Bézique (three Queens of Spades and three Knives of Diamonds) counts 1500, and the game is usually for 2000 points.

Four-Handed Bezique. Four packs are used, and the players may play as partners or each for himself. In the former case a player may declare when his partner takes a trick, and Béziques in the hands of partners may be declared as Double or Triple Béziques. In playing the last eight tricks in Four-Handed Bézique the winner of the previous trick and his left-hand opponent sometimes play by themselves, and then the other two play in like manner. The players should agree beforehand whether this is to be done.

In Three and Four Handed Bézique the rules are the same as in the two-handed game, except that if a player lay a card on the table by mistake or lead out of turn he must leave the exposed card on the table, and cannot use it in declaring. But if all the other players follow a wrong lead, it cannot be changed, and there is no penalty.

Bezique Panache. In this form of the game, four Aces, four Kings, four Queens, or four Knives, do not count when two or more of them are of the same suit.

Bézique is also played sometimes without turning up any trump, and the trump suit is that of the first Marriage that is declared, which is thus necessarily a Royal Marriage.

Bézique probably originated in France, where the name is spelled *Bésigue*. It was introduced into Paris in 1826, but had been a favorite in some of the French provinces for a long time before. The word Bésigue is derived by some from the German *besiegen* (to conquer); and by others from the Latin *bijugum* (a yoke), from the yoking together of

two cards in the Bézique and the Marriages.

Sixty-Six, a kind of Bézique. In the two-handed game one pack is used, from which all cards below the Nine are left out. Each player is dealt six cards, three at a time, and the only groups that can be declared are Common and Royal Marriages, which count as in ordinary Bézique. A player who declares a marriage must lead one of the declared cards. The cards count as follows to the winner of the trick containing them :

Ace 11	Queen 3
Ten 10	Knave 2
King 4	Nine 0

When a player has scored 66 it counts him one point toward game, and the remaining cards in hand are not played. If he makes 66 before his opponent scores 33 it counts him two points, and if before his opponent wins a trick, three points. The scoring must be done mentally. He who first makes seven points wins the game. When a player thinks he can make 66 without drawing any more cards, he may turn down the trump, if he has the lead, and drawing ceases. This is called closing, and may take place even at the opening of the game, before a card has been drawn. After the trump is turned down, the cards are played as if the stock were exhausted, suit being followed and the second player being obliged to take the trick if he can. In closing, the last trick counts nothing. If the player who closes fails to make 66, his opponent scores two points, and if a player close before his opponent has won a trick, and fails to make 66, his opponent scores three points. Whenever a player announces that he has made 66 his opponent may look at the cards to see whether he is correct. It will be seen that the two together cannot make less than 130. If this is evenly divided, so that each has 65, neither scores, but the winner of the next hand scores an extra

point. In all other respects Sixty Six is played like Bézique, and the rules are the same. The Nine of trumps can be exchanged for the trump card, like the seven in Bézique, but counts nothing.

Three-Handed Sixty-Six. The dealer gives each of the other players six cards, but none to himself, and when the hand is played scores the same number of points as the winner of the round, but the dealer is not allowed to score his seventh point. The game is frequently played thus in Germany.

Four-Handed Sixty-Six. The sevens and eights are added to the pack, and partners are decided upon by dealing the cards, face upward, until aces have fallen to two of the company, who must play together. The player who received the first ace deals first. The whole pack is dealt, and the last card, which is turned as trump, is the dealer's property. There is thus neither drawing nor closing, and there is also no declaration of marriages. The players must follow suit if possible ; otherwise, they must trump if they can ; and when trumps are led, each must try to take the trick. The last trick counts ten. If at the end of the round the winning partners have scored 66 it counts them one point toward game, if 100, two points, and if they have won every trick, three points. He who takes the Ten of trumps scores a point at once, thus winning the game if he have six points, though his opponents may be ahead in other respects. In Germany there are forms of this game called *Mariage* (Marriage) and *Sechshundsechzig* (Sixty-six) and the four-handed game is called *Kreuzmariage* (Cross-marriage).

Pinocle, a kind of Bézique played with two packs from which all the cards but the Aces, Tens, Kings, Queens, Knaves, and Nines have been discarded. In the two-handed game each player receives twelve cards, four at a time. The game is

1000 points, toward which the cards that are won in tricks count as in Sixty-Six, and the groups of cards that are declared, as in Bézique, with the additions and exceptions noted below. In this game Bézique is called Pinocle, a group is called a Meld, and declaring is called melding.

Double Pinocle counts	300
A Sequence	" 150
Eight Aces	count 1000
Eight Kings	" 800
Eight Queens	" 600
Eight Knaves	" 400

The Nine of trumps is treated like

the Seven in Bézique, and when the stock is exhausted the last twelve tricks are played like the last eight in Bézique. Only one Meld can be made at a time, and a Pinocle, if melded, cannot be used as part of a Double Pinocle. In all other respects the game is played like Bézique.

Three-Handed and Four-Handed Pinocle. The cards are all dealt, four at a time; suit must be followed, and the trick taken, if possible. At the beginning of the game, each player in order, beginning at the dealer's left, melds what he has, and the meld is noted, but cannot be

Fig. 1. Position in Playing Billiards.

added to his score till he has taken a trick. In the four-handed game each plays his first card before thus melding. When four play the game, they may play as partners or each for himself.

BICYCLING. See CYCLING.

BILLIARDS. Billiard tables originally were six feet wide by twelve feet long, with openings cut through

the cushion rails at each corner and at the centers of each side rail. Pockets of worsted network were attached to these openings, into which the balls would drop. The table now generally in use, however, is the carom table, without pockets. Tables five feet by ten are used by the great experts in their match contests, while public rooms, hotels,

clubs, and private houses are mostly fitted with four and a half by nine tables. Pocket tables of both these sizes are still used for pool. Smaller tables are built to order to suit purchasers.

Billiard balls are usually made of ivory, but sometimes of a patent composition. Composition balls are cheaper than ivory but are little used for billiards, though generally for pool. Standard billiard balls are $2\frac{1}{8}$ inches in diameter. Pool balls vary in size from $2\frac{1}{4}$ to $2\frac{3}{4}$ inches.

Cues are from 4 feet 6 inches to 4 feet 9 inches in length, and are from $1\frac{1}{4}$ inches to $1\frac{1}{2}$ inches in diameter at the butt, and vary from $\frac{1}{4}$ to $\frac{3}{8}$ of an inch in size at the top; and varying in weight from 12 to 21 ounces. Figs. 1, 2, and 3 show the various ways of holding the cue, which should be

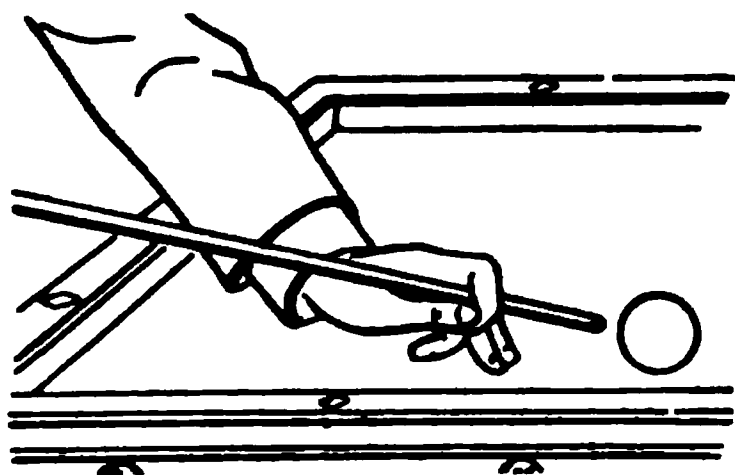


Fig. 2. An Alternate Position of Left Hand.

held loosely when preparing for the stroke, and never "grabbed" except when making a "draw" (see below).

In billiards proper, there are four balls, two white, one being distinguished from the other by a black spot, and two red, one dark and the other light; but experts and professional players usually play games in which only three balls are needed, two white and one red. Each carom table has on it two spots, along an imaginary line drawn lengthways through the centre from the middle nails or "sights" in the head and lower cushions: the first, opposite the second "sight," is sometimes called the light red

spot, the second, opposite the sixth "sight," the dark red spot, because they mark the positions of those two balls in the opening of the American four-ball game. On pocket tables there is a third spot three inches from the lower cushion, on which the white ball not played is placed on opening the game and after being pocketed; and other spots are used for playing pool and the English game. A line supposed to be drawn across the table through the light red spot is called the string-line, because it is used in "stringing" for lead—that is, choice of balls and first play: each player plays a ball from within this line at the head of the table against the cushion at the foot, and he whose ball stops nearest the head cushion on the return wins the choice.

Four Ball, or American Game. This game is now played on a carom table for 34 points up. But the game may be for any number of points agreed upon. The leader plays his ball from within the string line, so as to pass the dark red ball, but not rebound past it or strike it. His opponent then plays his ball in like manner, attempting to strike the white ball, and one of the red balls. If he strike the two balls, it is called a carom, and counts one point. If he strike all three balls, he counts two. The striker's ball may rebound from a cushion any number of times before the carom is completed. As long as the striker can carom he can continue his hand or inning. The obligation to hit the white ball first holds only in the opening stroke, and afterwards during the game each may play his ball at any of the other balls.

Three-Ball Billiards, or French Caroms. There is but one red ball, which is "spotted" on the lower spot. One white ball is placed on the upper spot, and the player who has first turn places his ball not more than six inches from it and within the string. The first player

must hit the red ball with his own before striking his opponent's ball (though only at the opening stroke, as in the four-ball game). In other respects the game is like the four-ball game.

The best recorded run at the three-ball carom game is 1531, made by Maurice Vignaux in Paris, France, in 1880, in a match contest played with George F. Slosson of New York.

Harvey McKenna, in playing an exhibition game in Boston, Mass., in

1887, made a run of 2572, but the critics and experts of the world do not accept this as a record. The best run at the four-ball carom game, 1483, was made by I. McDevitt in New York, in 1868.

In match games, a space $4\frac{1}{2}$ inches square at each corner of the table is called the "crotch," and when the centers of both object-balls are within a crotch, the player is not allowed to make more than three caroms unless he force one of the

Fig. 3. Using the Bridge.

balls out of the crotch. This rule is to prevent players from making long runs in the corner of the table, as can be done by one of moderate skill.

Balk Line Game. Four lines are drawn on the table each at a distance of eight to fourteen inches, as may be agreed, from one of the cushions, forming eight compartments or spaces. Not more than two successive caroms can be made

on object balls the centers of which are within any one of these spaces.

All these games can be played by three persons, if they use alternate white balls, or four if they are divided into sides, those on the same side using the same ball in turn.

Pocket Game. This game is played on a six-pocket or a four-pocket table, the side pockets being sometimes omitted. If the cue-ball strikes the object-ball so as to drive

it into a pocket, or "pocket" it, it is a "winning hazard" and counts a point. If a player tries to pocket a ball and fails and does not carom, his inning comes to an end. Car-

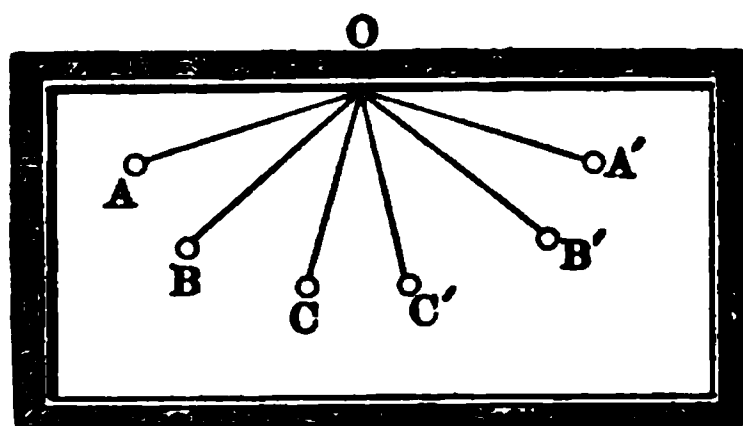


Fig. 4.

oms count as in the ordinary game, and the winner must make 100 points.

Practical Suggestions. The art of playing billiards is not so much

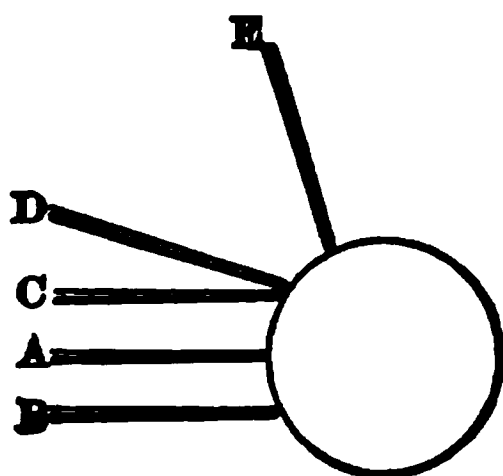


Fig. 5.

the art of making the balls go as they are aimed, as of overcoming their tendency to go as they are aimed. If a ball strikes another ball

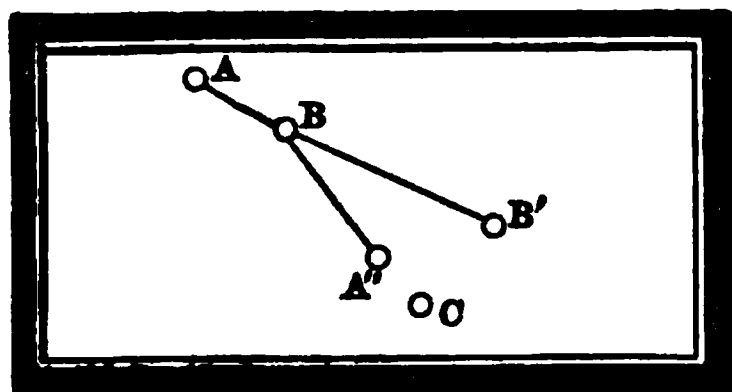


Fig. 6.

or a cushion, its natural tendency is to rebound at the same angle that it struck on; for instance, (See Fig. 4) if the ball strikes the cushion on the line AO , its natural tendency is to

go off to A' ; if struck along BO it goes to B' , and if along CO to C' ; but suppose that while your ball is at B another ball that you want to hit after striking the cushion is at A' , then you must strike the ball at B on its right side, as to give it a spinning motion which will prevent its running out as far as B' . Or if you wanted it to come nearer the middle of the table, say to C , you should give it the opposite spinning motion by striking it on its left side. The



Fig. 7.

same would be true if the cue-ball were to first strike another ball instead of striking the cushion. The effect of side twist on the rebound of a ball, either from another ball or from a cushion, is to make it bound farther to the side on which the cue struck it. In addition to the twists toward the side, a ball can be given a twist forward or backward. If a ball is struck by the cue square in the center, as at A (Fig. 5) and strikes the object-ball square in the center, the

cue-ball will part with all its motion to the object-ball and will stop still, the object-ball going on in the same line. But if the cue-ball is struck above the center, as at *C*, it gets an extra twist forward which will make it follow the object-ball, and if it is struck on one side as well as above the center, it will not follow straight,

but will follow toward that side, so that it may strike a second ball on that side of the table of the object-ball; thus (See Fig. 6), *A* being twisted forward and to the right does not stop at *B*, but follows on to the right to *A'*, and the object ball *B* goes on to *B'*.

The reverse of this is true when *A*

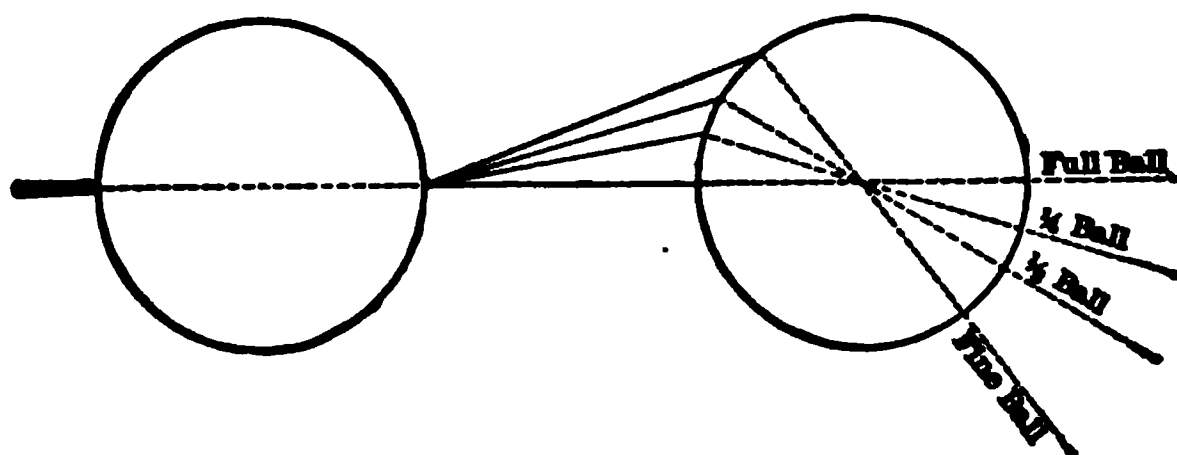


Fig. 8.

instead of being struck above the center is struck below, as at *B* (Fig. 5), *but not pushed*. It gets a backward twist. The ball *B* in Fig. 6 would go on to *B'* and *A* would roll back to its original position at *A*. This stroke needs practice, however, as, if the cue does

not leave the ball as soon as it has struck it, but pushes it a little, the twist will be destroyed. This backward twist is generally termed a "draw," and the forward one a "follow." The side twist is sometimes termed "English."

It is very seldom that the balls are in such positions that strokes can be made without follow, draw, or twist. The art of playing billiards is not so much the art of starting the cue-ball straight for the object, as of starting it with just the proper twist to make it behave as you wish after it has struck the object.

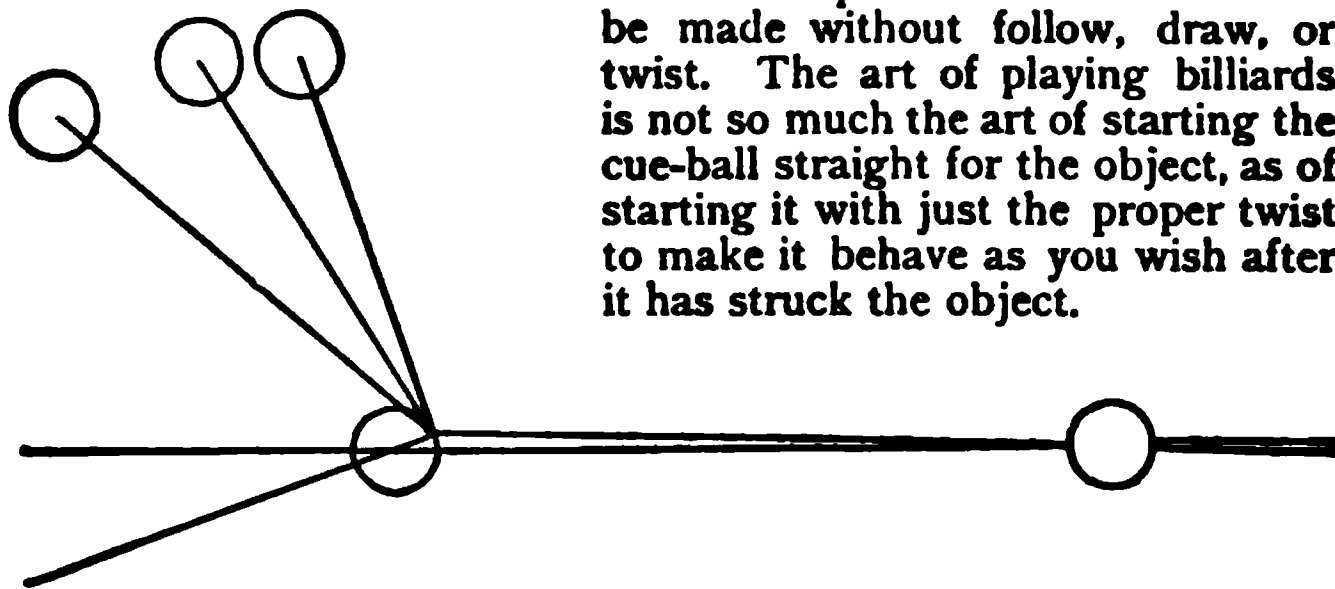


Fig. 9.

If the cue is held as in *D* (Fig. 5), it makes a "jump" stroke and causes the ball to bound into the air. The position marked *E* is called *massé* and makes the ball roll backward, or move on a curve. The manner of holding the cue in the *massé*

is shown in Fig. 7. Both jump and *massé* are too difficult for beginners.

If the cue-ball strikes the object-ball squarely in the center, it is called a "full ball"; if it barely scrapes the edge it is a "fine ball," and balls between these extremes are called

"half ball," "quarter ball," and so on. (See Fig. 8). The dotted lines show how the object-ball will move after each of these shots. In general, the more widely the object-ball, after being struck, departs from the first direction of the cue-ball, the less the cue-ball will depart from its first direction, but the force with which the cue-ball is struck has much to do with the result. The harder the cue-ball is struck, the more will it depart from its first direction, as in Fig. 9, where 1 shows the hardest stroke, etc.

These strokes should all be practiced by the beginner, who will learn by experience the result of each.

The diagrams, Figs. 10, 11, 12, and 13, show various shots, which, in some shape or other, are constantly offering. The full lines show the path of the cue-ball before it strikes the object-ball; and the broken line, its course after it has bounded from the object-ball.

Fig. 10 shows two shots: in the left hand one, the ball *a* must be struck forcibly above the center and just graze *b*. In the right hand one, the cue-ball *d* must strike *e* half-ball. In Fig. 11, the cue-ball *g* on the left must be struck sharply on the left side below the center. The one in the middle (a simple "follow shot") shows how a carom can be made, even when the three balls are in a straight line; the cue-ball *a* must be played forcibly at *b*, the merest shade to one side. Then *b* will strike *c* on the other side and pass to that side of it; *c* will go to the cushion and come back to meet *a*, which will follow on to it. In the shot on the right, *d* must be played high on the left side, full at *e*.

In Fig. 12, the cue-ball *a* on the right hand must be played low on the right side. The cue-ball on the left, *d*, must be played forcibly on the right side below the center.

In Fig. 13, the ball *a* on the left must be played high on the right side, striking *b* as a three-quarters ball; the cue-ball on the right must be

played very low on the right side so as to hit between *e* and the cushion, striking both at nearly the same instant.

RULES OF THE GAME.

These are usually changed slightly for each particular match. The ones given below are simplified from those generally observed.

1. In stringing for lead, if a player's ball touch his opponent's after the latter has stopped, the former loses choice and lead. If the balls strike while both are moving the players must string again. In stringing, one ball must not reach the bottom cushion before the other is in motion.

2. In the lead, if the ball led do not pass the dark red ball, or if it bound back past it, or if it jump from the table, or strike either red ball, the leader's opponent may take the lead instead, or he may place the offender's ball five inches from the center of the lower cushion, or require him to lead over again.

3. Should the first player fail to hit the white ball first, or if any player during the game fail to hit a ball, a point is added to his opponent's score.

4. If a player's ball goes off the table, a point may be added to his opponent's score, and the ball remains off the table until its next turn. But, in the three ball game, no forfeit is required, and the ball is "spotted." If possible it is placed on the spot at the head of the table; if that be occupied, on the spot at the foot, and, if the latter be occupied, in the center of the table.

5. Balls forced off the table shall be spotted as above, but each ball must be placed on its own spot if possible. The cue-ball if it go off the table must be played from the string, as at the opening of the game. When the cue-ball is thus played it must not be played directly at any ball or cushion behind the string line.

6. Should a player play with the wrong ball, he cannot count, and the position of balls must be transposed,

unless the player has made his second stroke before the error is discovered; in which case he may continue to play with the same ball, or have the balls changed. But at the end of the run the position of the balls must be transposed.

7. Should both white balls be off the table together and a player pick

up the wrong one, and play with it, the stroke is good.

8. The striker must not play till every ball on the table is at rest.

9. The cue must be withdrawn before the cue-ball touches the object-ball.

10. The cue must touch the ball but once.



Fig. 10.

Fig. 11.

11. The player must keep at least one foot on the floor while playing.

12. No player can score by a play violating any of the four preceding rules.

13. If the cue-ball is touching another ball the player must play first upon some other ball than the one the cue-ball touches.

In the Three Ball game the balls

are generally "spotted" when the cue-ball touches another, and the striker plays as in opening the game.

14. If the cue-ball touch two balls or more so that it is impossible to play first on some other ball, the balls must be spotted as at the beginning of the game, and the player whose turn it is may choose whether he or his opponent shall lead.

Pool, a game played on a pocket-table, in which the object is not to carom, but to pocket the balls. There are several kinds.

Fifteen Ball Pool. There are fifteen object-balls, colored, and marked with numbers from 1 to 15. The deep-red ball, which bears the highest number, is placed on its usual spot,

and the others are placed close together to form a triangle of which it is the point, the base of the triangle being toward the lower cushion. Any number of persons may play, all using the same white ball, in an order decided by lot before beginning. The first player plays the cue-ball from within the string line;



Fig. 12.

Fig. 13.



after that it is played from wherever it may be, unless it leaves the table, when it must be played from within the string line. A player scores the number of the ball or balls that he pockets, unless he pocket one or more object balls and the white ball, in which case the object-balls must be placed on the dark-red spot or directly behind it,

while three points are deducted from the player's score. Three points also are deducted from the score of any one who misses a ball, or plays his ball so that it leaves the table. As in ordinary Billiards, an inning ends only when the player fails to score. A player may play against any object-ball, even when the cue-ball touches it, and the cue

need not leave the cue-ball before it strikes the object-ball. Every pocketed ball remains pocketed except the white, as described above, so 120 is the highest number of aggregate points that can be made.

Rules of the Game. Billiard rules 8, 10, 11, and 12 apply to this game, and in addition the following:

1. When the cue-ball is played from within the string line, it can be played directly at no ball in the string. But if all the object-balls are in the string, the one nearest the line may be spotted and played on.

2. If the player move his ball before making his stroke, it shall be considered a stroke. If he move an object-ball, either before or after a stroke, he loses his hand and the moved ball must be replaced.

3. If a player play out of turn, the balls shall be replaced; and he cannot count unless he make more than one stroke before the mistake is discovered, when the play is good.

Pyramid Pool. This differs from Fifteen Ball Pool only in the manner of counting. Each ball pocketed counts one point, and 15 is therefore the highest score that can be made. The rules are the same as those of Fifteen Ball Pool. The score is often kept by placing each ball, as it is pocketed, in a frame, containing a sort of trough for each player. Whenever a player pockets the white ball, or misses a shot, one of the balls in his trough is replaced on the table.

Pin Pool. Five small wooden pins are set up in the centre of the table; each having a number marked on the table beside it, as in the figure.

4.
3. 5. 2.
1.

The pins are placed about 2½ inches apart so that the balls can pass between them without touching. The object of the players is to overturn the pins, or move them at least two inches from the spots where

they were placed. Two white balls and one red are used; the red ball is spotted about five inches from the lower cushion and one of the white balls is placed on the dark red spot. After the order of play has been determined by lot, each player draws a little ball from a bag, or is given one by some person not a player. These balls are numbered in order, and are called the private balls. Each player keeps secret the number on his private ball till he has overturned pins the sum of whose numbers, with that on his ball, exactly equals 31, when he wins the game. But if the sum is more than 31, he is said to be "burst" and is out of the game, unless he claim what is called "the privilege." In this case he draws a new private ball, and, after choosing between the old and new, discards one of them and continues in the game.

The game is begun thus. After the white and red ball have been spotted, as explained above, the leader plays at either with the remaining white ball from within the string line, or he may place his own ball upon the spot at the head of the table, and the next player must then play. The second player and the others after him may play at or with any of the three balls, red or white. Pins must not be played at directly, but must be overturned by a rebound of the cue-ball from a cushion or an object-ball, except when two balls are in contact, when either may be played directly at the pins. If a player knock down the four outside pins in one shot, leaving the middle one standing, he wins the game at once, no matter what his score is. All pins knocked down are replaced before the next shot.

Rules of the Game. 1. No player may claim privilege after the next stroke has been made.

2. When a player claims privilege, his order in playing is not changed.

3. If a player miss, pocket his ball, or cause it to leave the table, it must

be spotted five inches from the center of the lower cushion; or, if that spot is occupied, on the dark-red spot; or, if that spot is occupied, on the light-red spot.

4. If a pin be knocked down, and a ball roll into its place, the pin must not be replaced till the ball is moved in course of play.

5. A pin is considered knocked down when it has been moved two inches, even though it remain upright.

6. Pins must be knocked down by rebound of the cue-ball from a cushion or an object-ball; or by an object-ball so set in motion, except when two balls are in contact, when either can be played directly.

History. Little is known of the origin of Billiards, some authorities

saying that it was invented in France, others in Germany, and still others in England. It seems to have been derived from BOWLS or Pall Mall (see CROQUET); and it is said that Henrique Devigne, who lived in the time of Charles IX. of France, first gave it form and rule. Louis XIV. was advised by his physician to practice the game after eating, to aid digestion, and since his time it has been a favorite in France. It was played in England certainly as early as the 16th century, for Shakespeare in "Antony and Cleopatra," makes Cleopatra say, "Let us to billiards."

In the earliest times the game was played by driving a ball through a ring which turned on a pin fastened in a table or on the floor. A game



Ancient Billiards.

called Rural Billiards is still played thus in England. When it began to assume the present form, the balls were struck or pushed with a sort of mace, but about 1789 the cue came into general use. When the game was first played in the United States, the use of the cue was forbidden to all but skillful players, lest the cloth on the table should be injured. This was before the introduction of leather cue tips which are now used everywhere. The top of the table, now of slate or marble, covered with cloth, was formerly of wood. The cushions were first stuffed with list, then made of india rubber, and now they are generally of a combination of various substances as suggested by Michael Phelan, an American player and billiard-table manufacturer. In the old form of cushions the ball

sank in a little way, so that it never bounded correctly; but the modern cushions are comparatively hard on the outside, with an elastic backing. A table was once made in this country with cushions stuffed with curled hair.

The game was introduced into the United States in the first years of this century, and it is now played more here than in any other country in the world. The early tables all had pockets; pocketing a red ball counted 3, a white ball 2; caroming on the 2 reds counted 3, and on a red and a white, 2, so that it was possible, and not unknown, for a single stroke to count 13. The game was 100 points up. This game began to go out of use about 1860, as cushions were improved by Phelan, and consequently longer rolls and more com-

plex caroms were possible. First the side pockets were left off the tables, and, by about 1870, the corner pockets disappeared too. Meantime however, the French, the best players in the world, had used smaller tables, without pockets, so as to make complex caroms.

The games already described are those now generally played in the United States. The English game employs not only caroms but winning and losing hazards, as in the old Ameri-

can game, but both kinds of hazards score in the player's favor. Other games played in England are the White winning game, the White losing game, the Red winning game, and the Red losing game, in all of which caroms do not count at all. In Germany a kind of pool is played called *Wurst Partie* (The Sausage Game), because the balls are placed in a line supposed to look like a sausage. The Russians have a kind of billiards called Carline or Caroline which re-

Billiards in 1650.

sembles the American game, and very many other kinds are played in different countries.

The word Billiards (French *Billard*) is from the French *bille*, a ball. Carom or Carrom is from the French *Carambole*, meaning the same thing. The origin of this last word is unknown, but some think it is a corruption of *Quatre Boules* (four balls). In England a carom is called a cannon. The word cue is the same as the French *queue*, which means a tail or handle.

BILLIARD BALL AND CUES, experiment with. Place two billiard cues side by side on the table, so as to make a railway on which a billiard ball may roll. The small ends of the cues should touch, while the large ends are so far apart that the ball may be just placed between them. If a ball be now placed on the cues at the small ends, it will run to the large ends, apparently rolling up hill, though it really descends slightly, as will be seen by observing it closely.

BIRDS FLY, a game played by any number of persons, generally young children. One of the players calls out "Robins Fly" or "Cats Fly" (using the name of any bird or animal he chooses), at the same time holding up both his hands. If the creature mentioned be one that can fly, all the others raise their hands also, but if it cannot fly, all keep their hands down. Those who raise their hands when they ought not, or keep them down when they should raise them, pay forfeits. In France this game is called *Pigeon Vole* (The pigeon flies), and in Germany its title is *Alles was Federn hat fliegt hoch* (Everything which has feathers flies high).

BLACK ART. See GUESSING THE SIGN.

BLACKNESS, Experiment on. No paint nor substance in the world is perfectly black, for they all reflect a little light; but a design or figure may be made as follows, which will be nearly so, appearing even darker than the surface of black velvet. Paint a pasteboard box black on the inside, or cover the inside with dead-black cloth. Cut a small hole in the cover, not larger than one-tenth its area, and then holding the box so that no light enter the hole directly, it will appear intensely black. If the hole be shaped to represent some figure, an imp, for instance, and the outside of the cover coated with black cloth or painted black, the figure will appear dark in contrast even with its black background. The reason is that almost no light at all reaches the inside of the box, which is accordingly nearly quite black. This kind of black is called "Chevreul's Black," after a Frenchman who invented the method of producing it.

BLACK PETER, a game of CARDS played by any number of persons, not exceeding twelve. At the beginning, if necessary, one or more small cards are thrown out of the pack, so that those that remain may

be divided evenly among the players. They are then dealt, one at a time, and the last is turned up as trump. The cards rank as in WHIST. The object of the game is to take neither Black Peter (the Knave of Spades) nor the last trick in the hand, and with these exceptions it makes no difference who takes any of the tricks, except to decide the lead. Each player's score is credited with 10 points in the beginning, and at the end of each hand one point is subtracted from the score of the player who took Black Peter, and one from him who took the last trick. He whose score is first reduced to nothing is the loser, and is also called Black Peter, while he who has the highest score is the winner. Some amusing penalty for Black Peter to pay may be agreed on beforehand. (See FORFEITS.)

BLIND MAN'S BUFF, a game played by any number of persons, one of whom is blindfolded by tying a handkerchief over his eyes. The object of the blind-man is to catch one of the others. If he guess correctly the name of the one caught, that one must take his place as blind-man; if the guess be wrong, he must try to catch some one else. The players usually try to mislead the blind-man and turn his attention in various ways.

RULES OF THE GAME.

1. One who has been caught may be touched by the blind-man anywhere above the waist, but must not be pinched nor made in any way to utter a sound.

2. The blind-man must make his guess in one minute, or let the captive go.

3. No capture shall count that is made while looseness of the handkerchief allows the blind-man to see, no matter how little.

4. If any player is fairly held, even for an instant, he is caught, and must not try to get away, but a mere touch does not count.

Still Pond, a kind of Blind Man's Buff in which the players do not run about, but keep each in one place, without making the slightest noise. The blind-man gives them time to take what positions each wishes, and then cries "Still Pond!" (or, sometimes, "Still Proving, no Moving,") after which no one but him may move, or make a noise. The players generally prefer to hide under tables or on chairs, but one may often stand still in the middle of the room without being found. The rules are the same as for common Blind Man's Buff.

Seven Steps, a variation of Still Pond, in which each of the players is allowed to take not more than seven steps to escape from the blind-man. The steps may be taken at any time after he calls "Still Pond!" In other respects the game is played like Still Pond.

French Blind Man's Buff. The players form a ring, hand in hand, and the blind-man stands in the middle holding a wand, or cane. The players dance around him till he raps on the floor. When they stop, he holds out the cane, and the one to whom it points must grasp the end. The blind-man then asks any three questions he pleases, all of which must be answered in a changed voice. The blind-man guesses who is talking; if he is right, the two change places; but if he is wrong, the players dance about him again, and the game goes on. This is also called Blind Man's Wand, Buff with the Wand, Indian Buff, and, in New York, Peggy in the Ring.

Blind Man's Buff with Numbers, a form of the game in which the players, who are all numbered, sit around the room, while the blind-man stands in the middle. He calls out two numbers, and their owners must change places, the blind-man trying to catch them as they do so. No one can be caught after he has taken his seat. In this game the

blind-man does not have to guess the name of the one that he catches. Sometimes, instead of numbers, the players take the names of towns, and the blind-man calls out, for instance, "Let New York go to Chicago," when he wishes the players with these names to change places.

Jingling, a kind of Blind Man's Buff, played by any number of persons in a square place, inclosed by ropes, tied to corner-stakes. One of the players, who is chosen "Jingler," or "Bell man," has his hands tied behind his back and a bell fastened around his neck, while all the others are blindfolded. The blind-men try to catch the Jingler, guided by his bell, and the Jingler tries to deceive them in every way he can. Two blind-men often seize each other, each believing the other to be the Jingler. When any player succeeds in catching the Jingler, the two change places. In England, Jingling matches are popular at country fairs. If the Jingler can avoid his pursuers for a given time, he is the winner, otherwise the prize is given to the blind-man who catches him. The size of the space or "ring" in which the game is played, depends on the number of players and their agility. A few trials will usually determine the proper size. If the Jingler keeps too long from being caught, it is too large; if he is caught too soon, it should be larger.

In some parts of England a pig is placed in the ring instead of the Jingler, and the blind-men are armed with whips. He who hits the pig becomes its owner. The sport is usually more amusing to the spectators than to the contestants, as they are apt to give each other a sound beating before any one succeeds in hitting the pig.

Spoons, a kind of Blind Man's Buff in which the blind-man holds a large tablespoon in each hand. The other players circle around him till he cries "spoons!" when he advances and tries to guess who any

player is, by touching him with the spoon only. If he guesses correctly the player takes his place, otherwise the players circle around him as before.

History.—Blind Man's Buff is a very old game. The Greek youths

played it, calling it *muia chalké* (brazen fly). The old English name for it was Hoodman Blind. People often wore head-dresses called hoods, and the blind-man turned his over his face, while the others used theirs to strike him with, as shown in the illus-

Hoodman Blind.

tration, taken from an old manuscript in the Bodleian library at Oxford. It was also sometimes called Harry-racket and Hoodwink. The English had other blindfold games, one of which is shown in the second illustration. The French call it *Colin*

Maillard, which, it is said, was the name of a warrior in the 10th century, who continued to fight in a battle after both his eyes were put out. His full name was Jean Colin, and he was surnamed *Maillard* (Mallet-wielder) from his favorite

An Old English Blindfold Game.

weapon. The Germans have several names for the game, among which are *Blinde Kuh* (Blind Cow), and *Maus im Finstern* (Mouse in the Dark). The Italians call it *Mosca Cieca* (Blind Fly); the Norwegians, Blind Thief, and the Poles, Blind old

Man. French Blind Man's Buff is called in Germany *Blinde Kuh im Kreise* (Blind Cow in the Ring), or "Piep." The name Blind Man's Buff is probably from the blows, or buffets, that the blind-man gets from his companions.

BLIND MAN'S SINGING SCHOOL, a game played by any number of persons, one of whom is blindfolded and takes the part of teacher, while the others personate scholars. The scholars sing the scale, each singing one note, in order, to the syllable "Ah." They can sing correctly or not, as they please. When the teacher thinks he recognizes a voice, he says "Stop!" and, calling the scholar by name, makes some correction or criticism. If the name is given incorrectly the singing goes on; but if it is right, the scholar and teacher must change places. After the new teacher is blindfolded, the pupils must change seats, so that they cannot be recognized by the directions from which their voices come.

BLOCKADE, a SOLITAIRE game of CARDS, played with two full packs. The Kings and Aces are placed in two rows as they come from the pack. On the Kings, families are built by piling downward, and on the Aces, upward. Cards which cannot be so used are placed in rows of ten each, face upward, on the table, one row directly below another. Any card in the upper or lower row may be used in building, or any card having an empty space above or below it. Those having other cards above and below them are said to be blockaded, and cannot be used. When all the possible cards have been played at any time, the spaces must be filled in regular order from the pack. The player has the privilege of using one blockaded card in building, after the pack is exhausted.

BLOTTING-PAPER, Experiment with. Fill a goblet to overflowing with water, lay over it a thick sheet of blotting-paper, and on this place a pane of glass, or a plate. After the water has soaked a little into the paper the goblet will adhere to it so strongly that it may be picked up by the glass and even made to stand out sidewise from it. The reason is that

the blotting-paper soaks out some of the water from the inside of the glass, reducing the pressure there, and so the pressure of the air outside holds goblet and glass together.

With care the glass or plate can be dispensed with and the experiment performed with the paper alone.

BLOWPIPE, Experiments with the. The ordinary blowpipe is a metal tube shaped as shown in the illustration. When the short end (which is usually made of platinum

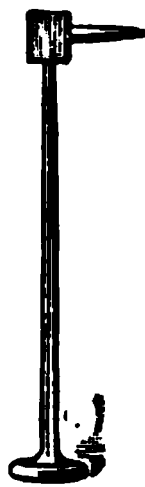


Fig. 1.
Blow-
pipe.

to prevent its melting) is placed in a flame and the mouth applied to the other end, a long, pointed, very hot tongue of flame is produced by blowing. The flame may be that of a candle, an alcohol lamp, or a gas burner. If a candle is used, the wick is bent over at right angles so as not to interfere with the blowpipe. If gas is used, a flat brass tube is slipped over the burner as shown in Fig. 2. Fig. 3 represents

the blowpipe flame. Blowpipes, burners, and everything needed for the experiments described in this article can be bought of any dealer in chemical supplies. The flame, as shown in Fig. 3, consists of a central blue part, B, and an outer part A, of another color. Either of these parts may be made larger at the expense of the other by varying the force of the breath, as will be found by experiment.

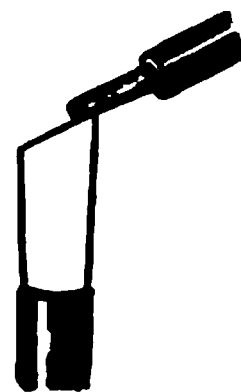


Fig. 2.
Burner.

Blowing. It is often necessary to keep the flame steady for several minutes. In order to do this, the operator must be able to take breath through his nose, while blowing. The effort should be simply to keep the cheeks constantly distended,

letting their elasticity drive the air out through the pipe.

EXPERIMENTS.

1. *Melting.* Take a small platinum wire or a bit of lime, and hold it in various parts of the blowpipe flame. (Objects may be so held by a pair of platinum forceps.) The wire will shine more brightly in some places than

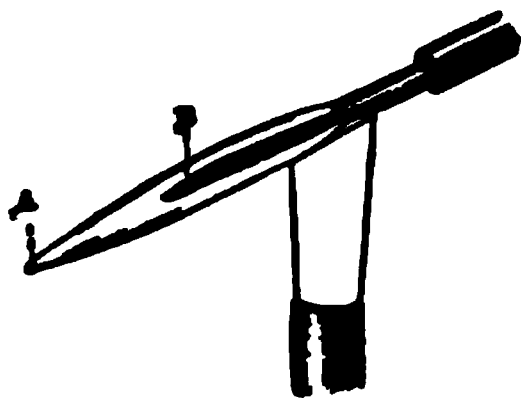


Fig. 3.

others, and it will thus be found that the hottest part of the flame is just at the tip A (Fig. 3), where it is almost invisible. Hold various substances, bits of glass, stone, or metal in this part of the flame, and it will be found that some melt easily in it, while others do not.

2. *Oxydizing.* Near the end of a strip of fine charcoal make a cavity by pressing the edge of a coin on it and turning it around. Put in the cavity a bit of lead or antimony and hold it in the tip of the flame A. The heat will oxydize it, that is, cause it to unite with the oxygen of the air. A colored film or coating of the oxide will form around the metal. Other metals may be tried in the same way. Some will form colored films and others will not.

3. *Reducing.* Mix together small equal quantities of dry washing soda and lead oxide. Put a little in the charcoal cavity, and heat it in the inner blue part of the flame, near the tip B, regulating the flame so that the mixture is surrounded by it. After a time little globules of lead will be seen in the mass. It may then be cooled, put with water into a little mortar and broken up, when the beads of lead can be picked out.

The lead came from the lead oxide, whose oxygen left it to unite with the gases of the blue flame. This is called reducing and the blue flame is called the reducing flame. Oxides of other metals may be treated in like manner.

Borax Beads. Fix a piece of platinum wire in a cork for a handle, and make a little loop at the end of the wire. Heat the loop red hot and dip it into powdered borax, some of which will stick to it. The borax may now be melted to a transparent bead, which will remain on the wire loop. This bead has the property of dissolving many of the oxides of metals, which give it different colors, as may be seen by trial. A minute speck of oxide is sufficient. If the bead be then held in the reducing flame, the metal may often be obtained from the oxide, forming a globule in the center of the bead, whence it may be taken out, when cool, by breaking with the hammer.

BLOW THE FEATHER, a game played by any number of persons sitting in a square around a stretched sheet, which they hold just below their mouths. On the sheet is placed a feather, which each must try to keep away from him by blowing it toward some one else. If it touches any one he pays a forfeit. The game is played also by persons sitting around a table and trying to keep the feather in the air by blowing it. If any player allow it to fall to the table in front of him, or to touch him, he pays a forfeit.

The game is sometimes called "French and English," in which case the players divide into two parties, which sit on opposite sides of the room. The room is divided into two "Camps" by a line drawn through the middle. Each side chooses a champion, who strives to blow the feather so that it will fall to the ground in the opposite Camp. When one succeeds, the other becomes a prisoner and leaves the game. He is replaced by a second

champion, and the game goes on till all on one side have been taken prisoners.

BLUE VITRIOL, Experiments with. Blue Vitriol, or Sulphate of Copper, is described in C. C. T. under VITRIOL. If the blue liquid left in the flask in making SULPHUR DIOXIDE be evaporated over a water bath, crystals of blue vitriol will finally appear.

1. If a crystal of blue vitriol be heated in a test-tube, it will turn to a white powder, and water will condense in the upper part of the tube. A drop of water on the powder will at once restore the original blue color.

2. Make a strong solution of blue vitriol, and dip into it a knife-blade, carefully cleaned and free from grease. In a few minutes, copper will be deposited on the blade, making it look as if made of that metal.

BOAT-BUILDING. Toy boats may either have hulls built of separate pieces or be cut out of a solid block. The latter method, being the easier, will be described first. The best wood to be used is even-grained, well-seasoned yellow pine. The dimensions of the block used for making a cutter yacht may be two feet long, five inches wide, and five inches deep, but the size and proportions may of course be varied to suit the builder. The block is first planed and squared, and then straight lines are drawn from end to end along the middle of two opposite sides. The ends of these are connected by similar lines across the ends of the block. All these lines must be carefully measured and drawn. On the side chosen for the deck a line is drawn across the middle at right angles to the long line, and then the deck plan is laid out as in the diagram. The curved lines must pass through the ends of the cross line, but their shape may be varied to suit the builder, provided the sides are exactly alike.

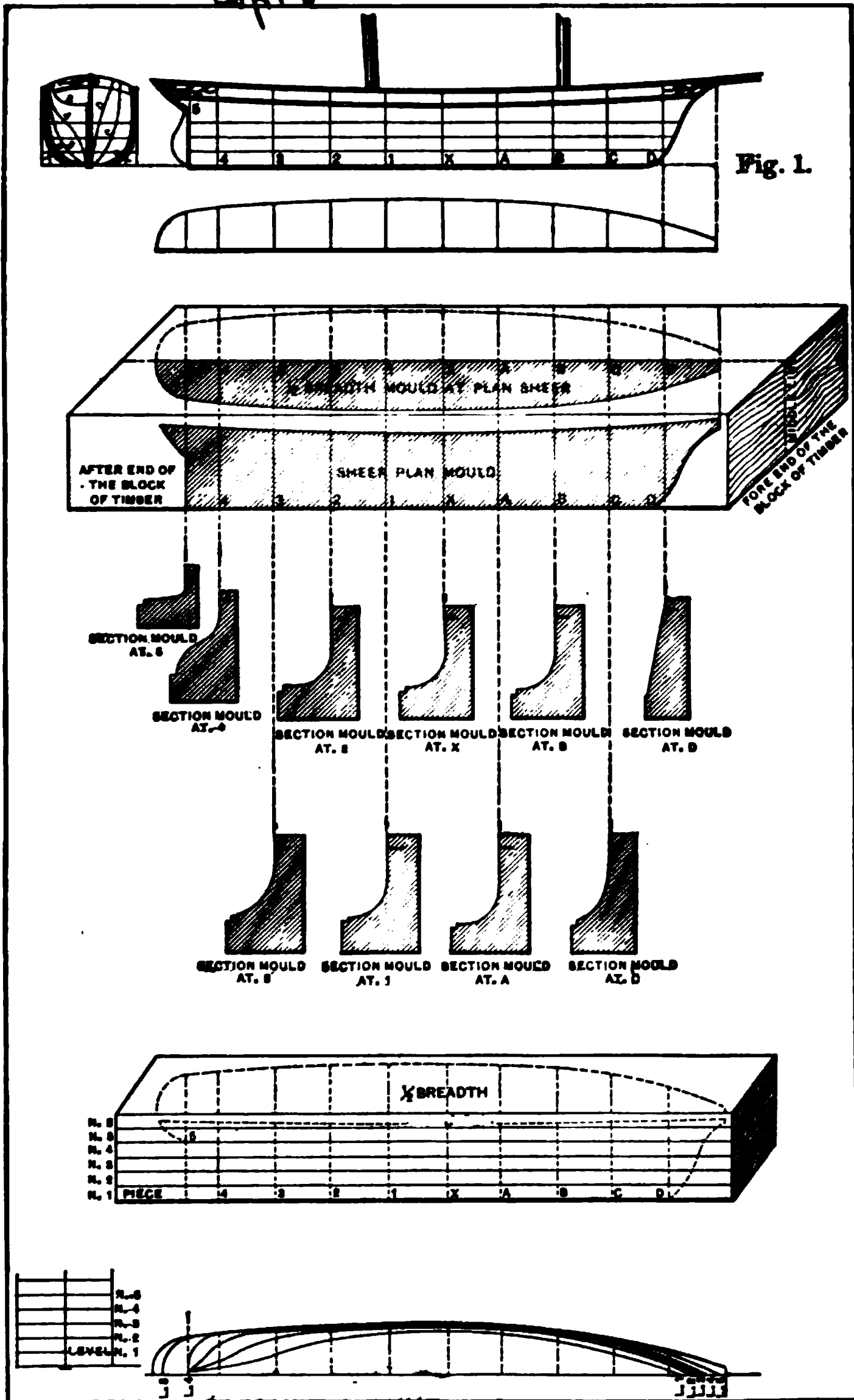
The first part to be shaped should

be the "counter," or overhanging stern, which is made as shown in the diagram at the place marked "After end of the block of timber."

Curves representing sections across the hull at different points are now drawn on paper, and pieces of cardboard called section molds are cut out to fit them. The block is turned deck downward, and the wood cut away with chisel and gouge till it fits the proper piece of cardboard at each place. As the wood nears its final shape care should be taken not to cut away too much, and the molds should be applied frequently. Besides these cross sections, lengthwise sections may also be used, which will make the work still more accurate. Both sections are shown in the diagrams, and others may be tried experimentally by the builder, or copied from the lines of large yachts. The diagrams at the top and bottom of the page show a method of laying them off from a drawing. The lowest figure shows the sweep of the lines from bow to stern at different levels, the outside lines denoting their shape at the top and the inside ones near the keel. A set of horizontal lines for the different levels are then made as shown in the square figure to the left, which must be just as high as the block used. To find the shape of the cross section at any place, for instance the third vertical line from the right (marked C in the uppermost figure), measure off the distance of each curved line from the center, on the same line at the bottom of the page, and lay off the respective distances on their corresponding levels at the left. When the points so formed are joined, a curved line will result like that marked C in the small figure at the top, and this will be the shape of the section at C. In the same way the sections at the other vertical lines may be found and molds made from them.

The fullest part of the hull should be at the "midship section," or just half way between the stem and stern.

cap. 8



The hull is now turned over and hollowed out with gouges, leaving the sides thick at first, and thinning them gradually. The upper half

from the nails. The mold is now filled with melted lead, which is taken out when it has hardened, and may then be shaped with a plane, as if it were of wood. The lower end of the false keel, at the bow, should be rounded.

Before nailing down the deck, holes must be bored in it for the mast and rudder. The hole for the mast in a boat of the size described should be half an inch in diameter, and eight inches from the bow. A similar hole must be bored part way through the bottom of the hull to fix the lower end. The mast should be half an inch in diameter, and is best made of pine. It is made in two parts, the lower of which must measure, between the deck and the topmast, just three times the greatest width of the vessel, in this case fifteen inches. Adding four inches for the part below the deck, and two and a half for the mast-head, the total length becomes twenty-one and a half inches. The mast must be rounded with a plane, or by whittling, and the mast-head (the upper two and a half inches) must be whittled down to half its diameter, to join it to the topmast. A quarter of an inch at the top must be made still smaller. The topmast is fastened to

Arrangement of Masts.

inch of the sides should be made very thin, for bulwarks, and a ledge should be left just below for the deck to rest upon. This is made of a thin piece of pine, cut to the proper shape. Some boats require a false keel to make them float properly. This is of lead, shaped in a mold made of three laths nailed together to form a narrow channel, which with the dimensions given above must be an inch and a half in depth and three-eighths of an inch thick. The channel is stopped at the ends with wood, so as to be exactly the length of the boat's keel. Six or eight nails are driven into the bottom of the mold, so that they will project from the lead keel when molded, and enable it to be fastened to the boat. The bottom of the mold should therefore be thin, so that it can easily be pulled away



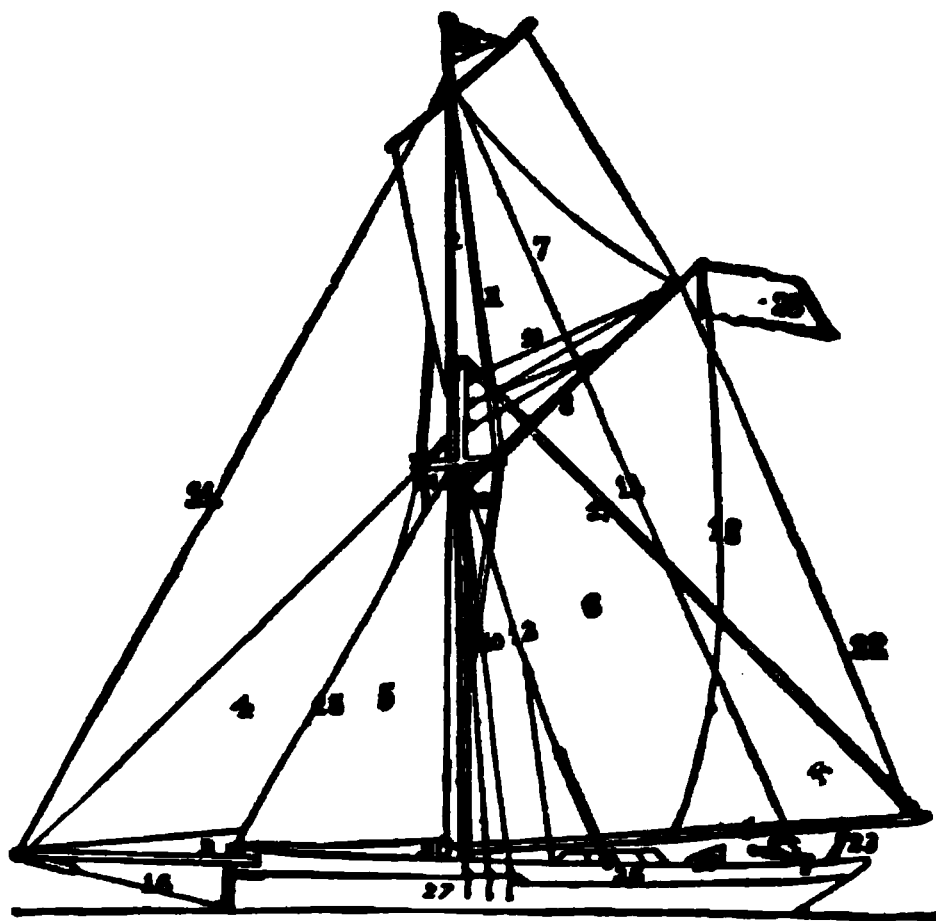
Ribs, Keel, and Keelson.

the lower mast by two "caps," seen in the illustration, the lower one resting on the lower part of the reduced portion, and the upper one fitting

the narrowest part. These may be made of hard wood or of brass. Before fixing the mast in the place prepared for it, about a dozen brass rings are placed on it. A cross-tree of flattened brass wire equal in length to the width of the boat is fastened at the top of the lower cap, and, through holes drilled in the ends, cords pass from the top of the mast to the bulwarks. These are called stays. The arrangement of these and other parts of the rigging for a

cutter yacht is shown in the figure. (For definitions of the various terms used, and hints on rigging different styles of boats, see the article on SAILING.) The bowsprit should have a length of about twice the beam, and a notch should be cut in the stem of the boat to receive it.

Instead of having a hull hollowed out of a block of wood, the boat may be built up like a real one. The keel is first made, then the stem and stern posts are set up, and then the



1. Mast.
2. Topmast.
3. Bowsprit.
4. Jib.
5. Foresail.
6. Mainsail.
7. Topsail.
8. Gaff.
9. Boom.
10. Shrouds.

11. Topmast Shrouds.
12. Runner.
13. Preventer.
14. Topmast Stay.
15. Forestay.
16. Bobstay.
17. Boom Lifts.
18. Ensign Halyards.
19. Mainsail Halyards.
20. Throat of Mainsail.

21. Crosstree.
22. Leech of Mainsail.
23. Mainsheet.
24. Tiller.
25. Companion.
26. Bulwarks.
27. Hull.
28. Ensign.
29. Burgee.
30. Foresheet.

ribs, which are sawed out of wood with a scroll saw, in curves, which are given by the cardboard models described above. The ribs are fitted in notches in the keel, held in place by glue, and then a strip of wood called the keelson is laid along the inside and nailed down to both ribs and keel, as shown in the figure. Then flexible boards, not more than one-eighth of an inch thick, are nailed

over the ribs with fine brads, to form the planking, the cracks between being filled in with putty. The rest of the construction is the same as with hollowed-out boats.

Sails. Patterns should first be cut from paper and adjusted in place, and, when these have been cut to the proper shape, they should be copied in white muslin. Each sail should be hemmed around the edges. The

luff of the mainsail is sewed to the rings on the mast, and its upper edge is fastened to the gaff by cords. The lower edge is fastened to the boom only at the corners.

BOAT RACING. See ROWING.

BOBÉCHON, a game played by any number of persons with the toy shown in the illustration, which is made as follows: Make a tight roll of flannel or cloth, about three inches high and half an inch in diameter, and secure it by winding thread around it. Sew this to the center of a circular piece of fur or very thick cloth, an inch and a half in diameter, so that it will stand upright on this circle as a base. This toy is called the Bobéchon. It

is then given a push, the coin will fall off into the plate. If, on the other hand, the rod be now applied to the upper part of the toy, it will tip over, throwing the coin outside, but itself falling on the plate. The proper way is to press the end of the rod on the farther edge of the plate so that it curves downwards, as shown in the second figure, the lower part of the curve touching the flannel roll just where it is sewed to the circle. The Bobéchon is then pushed slowly along till it reaches the sloping edge, when by a peculiar twist of the rod, learned only by practice, both it and the coin can be thrown without the plate. The toy is shown in the upper part of the cut; the way of removing it in the lower.

Bobéchon is a French game, and is said to be much used by sharpers in that country, who, being practiced, can always succeed, while their victims, who think the task very easy, always fail.

BOILING, Experiments in. 1. The boiling of water is described in C. C. T. in the article STEAM. It is best observed by filling a test-tube (see CHEMICAL EXPERIMENTS) a quarter full of cold water, and holding the lower end in the flame of an alcohol lamp or Bunsen burner. Little bubbles will first form and stick to the sides of the tube. By and by these will disappear, and other little bubbles, like white specks, will form in the lower part of the liquid, and rise toward the top, but will disappear before they get there. These rapidly increase in numbers and size and go higher and higher, till finally they burst from the top, when it is seen that they consist of steam. When they vanish before reaching the top a simmering or "singing" noise is heard. Afterward the noise is the bubbling sound of boiling. The first formed bubbles, which stick to the sides, are composed of air, which was dissolved in the water. The others are composed of steam, but as fast as they

Bobéchon.

is placed upright in the center of an ordinary dinner plate, and a small coin is laid on the top of the flannel roll. The object is to remove both Bobéchon and coin from the plate with a flexible rod or cane, like the end of a fishing rod. The coin need not keep its place on the flannel roll, so long as both it and the Bobéchon fall clear of the plate. The players take turns, and he who succeeds most times, in a number previously agreed upon, is the winner.

The task seems an easy one, but it is really very difficult, as will be seen on trial. If the rod be applied near the base, the Bobéchon with its coin may be slid along till it reaches the sloping edge of the plate, and if it

get further away from the heat of the flame they condense back to water, making the sound of simmering. By and by the water gets so hot all the way through that they can rise out of the top.

2. Buy a small chemical thermometer, which is simply a thermometer without any tin case, so that it can be put into liquids to get their temperature. The scale is marked directly on the glass tube. One can be made by taking an ordinary thermometer, scratching the divisions of the scale on the tube with a diamond, or a sharp file, and then removing the bulb and tube from the case. Put the thermometer into water before it begins to boil, being careful that it does not touch the bottom or sides of the vessel. As the water gets hotter, the mercury will rise until it boils, when the thermometer will stand at about 212° , if it has a Fahrenheit scale, or at 100° if it is Centigrade (See THERMOMETER, in C. C. T.). Chemical thermometers usually have the Centigrade scale, but if the one used has been made from an ordinary thermometer it will probably be Fahrenheit. This temperature is called the boiling point. If you now try to make the thermometer rise higher by continuing to hold it in the boiling water, you will find it impossible. No matter how much the heat is increased, the mercury will not rise any more, but the water will simply boil away faster. The reason is, that as soon as the water begins to boil all the heat is used in turning it to steam and not in raising its temperature.

3. Boil some water for ten or fifteen minutes; let it cool and then heat it again with the thermometer in it. By keeping it very still, you will probably find that it can be raised several degrees above the boiling point, without causing it to boil. If some scraps or filings of metal be now cast into it the water will at once begin to boil, and the mercury will fall to the boiling point. The

reason is that water with air dissolved in it boils sooner than pure water, and by boiling it once the air is driven out, so that at the second heating it rises higher than 212° . But when scraps of metal are dropped in they carry air with them, and boiling begins.

4. Find the boiling point of water with various substances—for instance salt or sugar—dissolved in it. In all cases it is higher than the boiling point of pure water. The reason is that it takes some heat to separate the water from the salt or sugar when it is turning to steam.

5. Boil water in a glass flask, and while it is boiling cork the flask tightly, and remove it at once from the flame. When it stops boiling pour cold water over the flask, and it will begin to boil again. This may be done several times. The same result will follow if the flask be plunged into cold water. The reason is that when a flask of boiling water is corked the space above the water is filled with steam, when this steam is turned to water by being cooled some of the pressure is removed from the surface of the water, which, accordingly, begins to boil again, since it is easier for the bubbles of steam to get out of the water.

6. Some time when you go up on a high mountain, take with you a chemical thermometer and an alcohol lamp, and find the boiling point of water there. It will be lower than 212° . This is because not so much air is pressing on the water on the summit as in the valley below. Sometimes the height of mountains is measured by finding the boiling point of water on their summits. On a mountain 6000 feet high, water boils at about 200° Fahrenheit, instead of 212° .

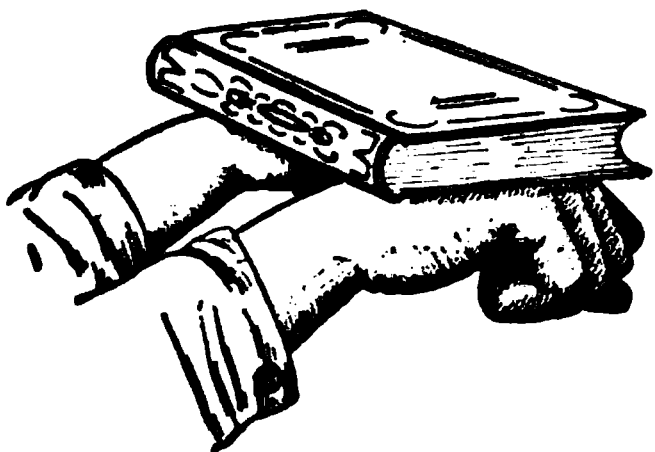
7. Find the boiling points of other fluids than water. It will be found that some are higher and some are lower, and that it is impossible to boil some of them at all—oils for instance.

8. Pour a little ether into a test-tube and hold it in the hand. The heat of the hand will cause it to boil, its boiling point being only 99° Fahrenheit.

9. Mix together water and bisulphide of carbon, both previously heated to 113° Fahrenheit. The mixture will at once begin to boil. This is because, contrary to the usual rule, a mixture of these two liquids boils at a lower temperature than either of them separately.

10. Weight a piece of ice as large as the tip of the little finger, by tying a bit of lead to it, so that it will sink to the bottom of a test-tube of water. Incline the tube and hold it in a flame so that the upper part of the water will be heated. The water above the ice may thus be boiled while the ice remains unmelted. The reason is that the water is a poor conductor of heat. If the ice be above the place where the heat is applied, the experiment does not succeed, because hot water, being lighter than cold, ascends and melts the ice.

BOOKBINDER, a game played by any number of persons, who sit in a circle, each holding a book on the back of his clenched fists. One, who has been chosen bookbinder and stands in the middle of the



Manner of Holding Book.

circle, goes to any player and seizing that player's book attempts to rap his knuckles, which the holder of the book tries to avoid by pulling back his hands quickly. If the bookbinder succeed in this, the player whose knuckles he raps changes places with him; otherwise, he re-

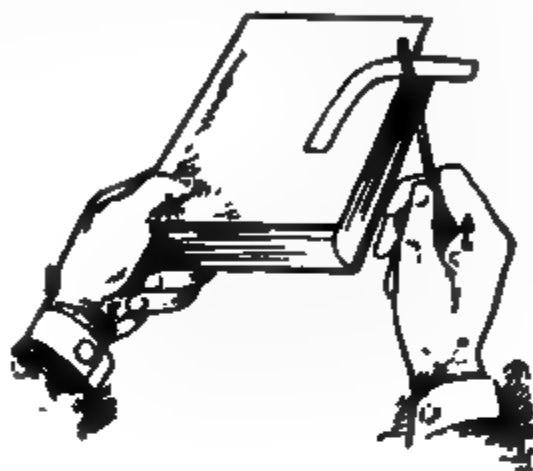
places the book and tries to do the same with some one else. The bookbinder may pretend to seize a book without actually doing so, and if the holder pulls away his hands so that the book fall, he must take the leader's place as if his knuckles had been rapped. The leader can make this game very exciting if he run quickly from one to another, pretending to take up one book and then seizing another, thus keeping the players constantly on the lookout.

BOOK NOTICES. A game played by any number of persons, each of whom has a pencil and sheet of paper. The players usually sit around a table, and each begins the game by writing at the top of the paper the pretended title of a book. The papers are then folded so as to hide what has been written, and passed to the left. Each then writes, just under the hidden title, the word "or" and follows it by a pretended sub-title. After this, the following are written in like manner, the papers being folded and passed, after each writing, as before. (3) The word "by," followed by a person's name (generally that of one of the players); (4) the words "author of," followed by another title; (5) the word "or" followed by another sub-title; (6) a pretended critical notice of the book; (7) the name of a newspaper or magazine.

The number of titles and notices may be increased at the pleasure of the company. When the papers are finished they are passed to the left again, and read aloud, one by each player; or one of the company may be chosen to read them all. An example of one of the papers thus written is as follows: "The Witch's Fate; or, A Treatise on Soap Boiling, by James M——, author of The Heavenly Bodies; or, What I Found in My Hat. This work, by its profound learning and fascinating style, can scarcely fail to place the author in the same rank with Shakespeare. London Times."

BOOMERANG, a flat curved piece of wood, used as a missile. When held by one end and thrown, it moves in a curve, and if thrown skillfully can be made to return to the place from which it started. Several boomerangs can be made, as shown in the illustration, from a piece of hickory wood, 1, half an inch thick, by steaming it thoroughly, and then bending it so that the sides

erang may be cut from pasteboard, and sent by placing it on a book with one end projecting over the right edge. The book is held in the left hand and the end of the boomerang struck with a ruler or paper-cutter held in the right hand. The best pasteboard boomerangs are



Sending a Paper Boomerang.

about an inch long, and can be snapped with the forefinger from the edge of a book. To throw a wooden boomerang accurately requires great skill, and can be learned only by practice. The instrument is held like a club in throwing it, the convex side outward. A large open



Making Boomerang.

are nearly at a right angle. The wood can be held in shape by tying it, till it is dry, and then strips about a quarter of an inch thick may be sawed from it, each of which when shaped with a knife will be a boomerang. The shape is shown at 2, and the end-wise view, when it is sawed across the middle, at 3. A single boomerang may be cut or sawed from a flat piece of wood, but it will be apt to split. A small boom-

Australian Throwing a Boomerang.

space should be taken for the trial, since the boomerang may curve in an unexpected direction.

The boomerang is used as a weapon by the natives of Australia, who throw it with great skill, making it strike an enemy in the back, while he is advancing toward them.

BOSTON, a game of CARDS, played by four persons with a full pack. The cards rank as in Whist. The pack is usually shuffled only at the beginning of the game. Before each succeeding deal it is cut, each player having the right to do so once, the dealer last. Shuffling is omitted that cards of the same suit may be kept together. The dealer gives each player thirteen cards, four, four, and five at a time. The eldest hand may now say "I pass," or undertake to win five or more tricks (called "bidding"). Each player, in turn, has the same privilege, but each must pass if he cannot bid to take more tricks than any one before him. When a player bids, the one that bid just before him may bid higher if he can, before the next one to the left has the privilege. If all the players pass, there is a new deal. Otherwise the bidding goes on around the table till all but one pass, but no one that has already passed may bid. The remaining bidder names the trump, and playing begins, the eldest hand leading. If the bidder wins as many tricks as he bid, or more, he scores the number of points shown in the table given below; otherwise each of the other players scores that number. Instead of bidding to take a certain number of tricks, a player may bid "Great Misery" or "Little Misery," and he may do this when he has already passed. He who bids Great Misery must play his cards so as not to take a single trick. If he take one, he loses. He who bids Little Misery must discard one card, and play the other twelve without taking a trick. In either case there is no trump. A player may bid either Great or Little Misery *Ouverte* (French for Open), in which case he must lay his cards face upward on the table and play them in that manner. These bids rank differently, as is shown in the following list of bids, where they are given in their order, beginning with the lowest :

- 1. Five Tricks, or Boston.
- 2. Six Tricks.
- 3. Seven Tricks.
- 4. Little Misery.
- 5. Eight Tricks.
- 6. Nine Tricks.
- 7. Great Misery.
- 8. Ten Tricks.
- 9. Eleven Tricks.
- 10. Little Misery *Ouverte*.
- 11. Twelve Tricks.
- 12. Great Misery *Ouverte*.
- 13. Thirteen Tricks or Grand Slam.

When all the players pass, instead of having a fresh deal, what is called Misery *Partout* (Misery All) is sometimes played by agreement. In this case there is no trump, and each tries to take as few tricks as he can. Each scores 10 for every trick he has less than each of the others. Thus, if A takes four tricks; B the same; C three and D two, since D has one less than C, two less than B, and two less than A, he scores 50. C scores 20, in like manner, and A and B score nothing.

The following table shows the number of points to be scored by a player taking all the tricks he bid, or more :

TRICKS Bid.	TRICKS TAKEN.								
	5	6	7	8	9	10	11	12	13
5	12	12	13	13	14	14	14	15	15
6		15	16	16	17	18	19	20	20
7			18	20	21	22	23	24	26
8				23	24	26	28	29	31
9					32	34	36	39	41
10						42	45	48	52
11							63	68	72
12								106	114
13									166

If a player does not take as many tricks as he bid, he is said to be "put in for" the number of tricks that are wanting, and each of the other players, all whom play against him, score the number of points he is "put in for." The following table shows what his opponents score in each case :

TRICKS Bid.	TRICKS "PUT IN FOR."												
	1	2	3	4	5	6	7	8	9	10	11	12	13
5	11	21	31	41	50								
6	15	24	35	45	55	66							
7	19	29	40	50	60	72	82						
8	23	34	46	56	67	78	89	110					
9	33	44	57	68	80	92	103	115	127				
10	44	56	70	82	94	107	119	132	145	157			
11	67	80	95	109	123	138	151	165	180	194	208		
12	113	130	148	165	182	200	217	234	252	270	286	304	
13	177	198	222	241	262	284	305	326	348	369	390	412	433

The bidder of Little Misery loses or wins 20 points; of Great Misery, 40; of Little Misery *Ouverte*, 80; and of Great Misery *Ouverte*, 160.

The score may be kept with counters, in which case they are divided equally among the players at the beginning. If the bidder win, each of the others gives him as many counters as the points he wins; if not, he gives each of them as many as the points he loses.

Boston is often played with two packs, in which case while the dealer is giving cards from one pack his partner turns up the top card of the other. The suit of the turned-up card is called "First Preference"; that of the same color, "Second Preference"; while the two remaining suits are called common suits. When a player bids anything but a Misery, his left-hand neighbor may say "I keep," meaning that he undertakes to win the same number of tricks by making one of the preference suits trump. This is called "playing in color." The next player may say "I keep over you," meaning that he undertakes to do the same with the turned-up suit as trump. This is called "playing in trump." A bid in color is always preferred to a common bid of the same rank, and one in trump to one in color.

RULES OF THE GAME.

1. In cutting for deal, the lowest deals.
2. If there be a misdeal, or the dealer expose any of the other players' cards, there must be a new deal.
3. If two packs are used, they

must be used alternately for dealing.

4. If a player deal out of turn or with the wrong pack, and complete the deal unnoticed, it must stand; and the player at his left deals next.

5. No player who passes may afterward bid during the same hand, unless he bids a Misery.

6. If a card be led or played out of turn, it must be taken back into the owner's hand, unless the whole trick has been played.

7. Cards so taken back, or otherwise exposed must be played when they are called for, unless playing them would cause a revoke.

8. Only the last trick may be looked at.

French Boston, or Boston de Fontainebleau. In bidding, the suits rank as follows, beginning with the highest: Diamonds, Hearts, Clubs, Spades. Each bidder must name with his bid the suit he purposes to make trumps (except of course in the case of a Misery, when there is no trump), and the same bid in a higher suit is given preference over it. The bids to win a certain number of tricks are called Six Levees, Seven Levees, and so on, and the Grand Slam is called "Chelem," or "Grand Boston." There are two new bids: "Picolissimo" (ranking between Seven and Eight Levees), in which the bidder discards one card as in Little Misery, but tries to win one trick, neither more nor less; and "Grand Boston on the Table," in which the bidder exposes his hand and tries to win every trick. The highest bidder, if he has bid to take

not more than ten tricks, may call for a partner or "Whister." Any player that is willing to aid him may answer "Whist," and the two together must then take three more tricks than the number that was bid. The partners share in profit and loss. If two or more players answer "Whist," that one is accepted who sits nearest the bidder's left hand.

The number of points or counters won or lost by the bidder is shown in the following table:

Five Levees (Boston),	10
Six Levees,	30
Little Misery,	75
Seven Levees,	50
Picolissimo,	100
Eight Levees,	70
Grand Misery,	150
Nine Levees,	90
Little Misery on the Table, . . .	200
Ten Levees,	110
Grand Misery on the Table, . . .	250
Eleven Levees,	130
Twelve Levees,	150
Chelem, or Grand Boston, . . .	400
Chelem on the Table,	600

The above figures are for the cases where Clubs or Spades are trumps. If Hearts are trumps 10 must be added to each number, and if Diamonds are trumps, 20 must be added to each number. For every trick taken beyond the number bid, 5 must be added.

The Ace, King, Queen, and Knave of Trumps are called honors. If the successful bidder hold the majority of them, each one that he has more than his opponents counts as an extra trick. Thus, if he hold three honors to his opponents' one, he is said to be "two by honors," and scores for two extra tricks. If he hold all the honors, he is "four by honors," and scores for four extra tricks. Honors do not count as tricks bid; for instance, if a player bid Six Levees, and take only five tricks, he loses, even if he have four honors. In all other respects, French Boston is played like the

common game. The player who plays alone, without a Whister, is sometimes said to play "Independence."

History. Boston is said to have originated in this country. Some writers say that it was taken to France by Benjamin Franklin and named after his native city. French authors say that the terms "Misery" and "Independence" refer respectively to the sufferings of the Americans in the Revolution and the cause for which they fought. Boiteau says: "Boston is the North American Whist; it was born in the war of independence; it is a political manifesto." However this may be, Boston has never been a popular game in this country, but became a great favorite in France, and was much played in Paris in the first half of this century. It is similar to other French games, and is probably of French origin, the name Boston and the terms "Independence," etc., being introduced at the time of the American Revolution. Boston is played in Germany and England also under the same name.

BOTTLE LIFTED WITH A STRAW. A bottle may be lifted with a stout straw, if it be bent and arranged within the bottle as shown in the illustration on next page.

BOTTLE, to Crawl into. Lay a bottle on the floor with the neck toward an open door. Say that you propose to try to crawl into it, if the audience will keep so still as not to disturb the experiment, and talk and act any hocus-pocus you please about the difficulties and dangers of the experiment. Make a fuss about arranging your dress, etc., etc. Go into the open room and face the audience, squint hard at the bottle, alter your position once or twice, get on your hands and knees, get up and adjust the bottle again, go out again, and after just enough fuss, but not too much, crawl in to the bottle.

BOTTLE TRICK. To pick up a handkerchief from the floor by the

teeth while balancing a bottle on the head: Bow the head well forward,

on both knees. Bend forward with the arms in advance, and parted about two feet, until they touch the floor. Extend the legs one by one backwards, swing forward between the arms so that most of the weight is on them. Seize the handkerchief by the teeth (Fig. 2), or the tongue



Bottle Trick—Fig. 2.

may assist, and rise as you descended. The bottle will invariably fall a little out of the perpendicular, but with a little practice can be easily kept in balance. The handkerchief should be bunched high, and placed about four feet in front of the body when upright.

BOUTS-RIMÉS (pronounced *boo re-mdy*), a game in which each player writes on a slip of paper four or more words that rhyme alternately, as boy, long, toy, strong. The slips are mixed; each player draws one, and must then write a verse whose lines end, in order, with the words he has drawn. The number of words and the order in which they rhyme may be varied by agreement of the players at the beginning of the game, and the subject of the verses may also be given out, increasing the difficulty of the task.

History. This game is French in origin, as its name shows. It is said to have been originated in 1648, by the poet Dulos, who was accustomed to write the rhymes of his sonnets before he filled in the other words. His friends, amused at this, devised a game on the same plan, and it became very popular in French society. Bouts-Rimés means rhymed ends. The Germans call it Endreimspiel (end-rhyme-play). The following verses are said to have been written by Horace Walpole, on

Lifting Bottle with a Straw.

and place an empty claret or champagne bottle on the crown. Gradu-



Bottle Trick—Fig. 1.

ally lower the body on one leg (Fig. 1), and come to a kneeling position

drawing the four words, brook, why, crook, I:

THE GENTLE SHEPHERD.

I sits with my toes in a brook,
And if any one asks me for why,
I hits 'em a rap with my crook,
And "'tis sentiment kills me," says I.

Machine Poetry, a kind of Bouts-Rimés where the rhymes are given by the holders of several cards. A pack of playing cards is dealt to the company in order, one at a time. One player begins by throwing out any card and calling out a word. The players who hold the corresponding cards in the other three suits do likewise, in order, to the left, each giving a word to rhyme with the first player's. The player of the last card must make a stanza of four lines ending with the four words in the order in which they were given. If a player hold more than one card of the same kind he may play them one after the other, or wait till the second round, as agreed by the company before the same begins. Instead of having all the rhymes in the stanza the same, two may be given alternately, or in any way the players choose. Sometimes the first player makes the "poetry" instead of the last player, and the game may be varied in other ways.

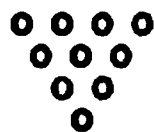
Instead of giving simply a word, the players may each furnish an entire line of the stanza.

Another method is for one player to select a sonnet from the works of any poet, and then read aloud, in order, the final words of each line, waiting after each till every player has composed a line ending with that word. The players thus compose poems the last words of whose lines are alike, but which differ widely in other respects.

BOWLING, the game of bowls, originally played on smooth turf, but now more generally on long, narrow platforms called alleys. The alleys, about 60 feet long and 4 feet wide, are usually constructed of narrow strips of yellow pine, set edgewise,

and made very smooth and nearly level. At the lower end is a depressed space, commonly floored with tan-bark or sawdust, and padded at the back to break the force of the balls, which are returned to the players by an attendant. The pins used are about 15 inches around at the thickest part, and 15 or 16 inches high. Balls (bowls) are of different sizes, to suit the taste of the players, varying from 5 to 10 inches in diameter.

Ten Pins, the game of bowls most common in the United States. The pins, ten in number, are set up on spots arranged in a triangle, as shown in the figure:



The pin at the point of the triangle, which is toward the player, is called the King Pin. The players take turns, and continue to bowl in the same order during the game, which lasts until each has had ten turns. Each player scores one point for every pin he knocks down, and is allowed to bowl three balls in each turn, unless he knocks down all the pins before he has used that number, in which case his play ceases. If he overturn them all with one ball (called making a "ten-strike") he is said to have a "double spare," and whatever he makes with the first two balls in his next turn counts on the former turn as well as on the latter. Thus, if a player make 10 with his first ball, he stops playing. If, in his next turn, he make with the three balls 4, 2, and 3 respectively, he scores 16 for his first turn and 9 for his second, the 4 and 2 counting twice. If the first ball of the second turn also make a ten-strike, then the first of the third turn counts as part of each of the three turns. If the pins are down after two balls have been played, the player has a "single spare" or "spare," and reckons in the same way what he makes with

the first ball of his next turn. If a spare or double spare be made in the tenth turn, the player rolls one or two extra balls. If a player make a spare, a cross is marked opposite his score for that turn; if he make a double spare, a double cross is used. This way of scoring, which is sometimes called "counting old and new," is generally used, but the players may agree on any other; for instance, if a player make a ten-strike, the pins may be set up again, and he may finish rolling his three balls before the next player takes his turn.

The scores are usually kept with chalk on blackboards at the side of the alleys. He wins whose score is the highest at the end of the game. The players may be divided into two sides, in which case the points made by those on each side are added to determine the winning side. Where there are two alleys, the players use them alternately, and the pins are set up on one alley, while bowling is going on at the other. Where there are only two players, they often bowl at the same time on different alleys, but they should change alleys at the end of each game.

Rules. The following rules are substantially those of the Amateur Athletic Bowling League, which have been adopted also by the Amateur Athletic Union. Those relating merely to matters of discipline have been omitted:

1. The game adopted to be played by clubs belonging to this League, shall be what is known as the American Ten Frame Game.

2. In the playing of match games there shall be a line drawn upon the alleys sixty feet from the head or front pin.

3. In the playing of match games, any wooden ball may be used that does not exceed twenty-seven inches in circumference.

4. The game shall consist of ten frames on each side, when, should the number of points be equal, the play shall be continued until a ma-

jority of points upon an equal number of frames shall be attained, which shall conclude the game. All strikes and spares made in the ten frame shall be completed before leaving the alley and on same alley as made.

5. In playing all match games, ten players from each Club shall constitute a full team.

6. Players must play in regular rotation, and after the first inning no changes can be made except with the consent of the Captains.

7. In match games two alleys only are to be used; a player to roll but one frame at a time, and to change alleys every frame.

8. The umpire shall take great care that the regulations respecting the balls, alleys, and all rules of the game are strictly observed. He shall be the judge of fair and unfair play, and shall determine all disputes and differences which may occur during the game.

9. In all matches the umpire shall be selected by the Captains of the respective teams, and he shall perform all the duties in Rule 8, except recording the game, which shall be done by two scorers, one of whom shall be appointed by each of the contending clubs.

10. Neither umpire, scorer, or player shall be changed during the match, unless with the consent of both Captains, except for reasons of illness or injury, or for a violation of these rules, and then the umpire may dismiss any such transgressors.

11. No person except the Captains shall be permitted to approach or speak with the Umpire, scorers, or players during the progress of the game, unless by special request of the Umpire.

13. Should either Club fail to produce its players within thirty minutes after the game is called, the Club so failing shall admit a defeat, and the game shall be considered as won, unless the delinquent Club fail to play on account of the recent death of one of its members, and

sufficient time has not elapsed to enable them to give their opponents due notice before arriving at the place appointed for the match.

14. A player must not step on or over the line in delivering the ball, nor after it has been delivered, until it leaves the alley. Any ball so delivered shall be deemed "foul," and the pins (if any made on such ball) shall be placed in the same positions as they were before the ball was rolled. It is also considered a foul ball if any part of the person should touch any part of the alley beyond the line before the ball leaves the alley. All foul balls shall count as balls rolled.

15. Should any ball delivered leave the alley before reaching the pins, or any ball rebound from the back cushion, the pins, if any, made on such balls shall not count, but must be placed in same position as they were before the ball was rolled. All such balls to count as balls rolled.

16. In all match games, two persons to act as Judges shall be chosen, one by each Captain, who shall take their positions at the head of the alleys and see that the pins are properly set up, and that no one interferes with them in any way until the player is through rolling. They will immediately report to the Captains any irregularities that they may notice during the game.

24. A regulation pin must be used in match playing. Each pin to be from fifteen to sixteen inches in length, fifteen inches in circumference at the thickest part, and two inches across the bottom.

26. In match games the dead wood must be removed from the alley after each ball. Should a pin fall on the removal of the dead wood, it is to be re-spotted.

27. Sufficient space shall be allotted to the participants in the game, to which none but members of the teams shall be admitted.

Nine Pins, a bowling game in which the king pin is omitted, and

the object is to leave one pin standing. He who does this in three balls or less scores one, and as each has ten turns, no more than ten points can be made.

Cocked Hat, a bowling game in which only the three corner pins of the triangle are set up. The method of playing is the same in Ten Pins. The player scores a point for each pin he overturns, and "spares" are played as in Ten Pins. The game is difficult, as the three pins are so far apart that it is hard to knock more than one at a time.

Four Back, a bowling game in which only four pins are set up, forming a straight line across the rear of the alley. Each pin knocked down counts one point, and Spares are scored as in Ten Pins.

Parlor Ten Pins. There are several forms of Ten Pins to be played in the parlor. In one, pins about a foot high are set up at one end of the room, and bowled at from the other with balls about the size of

TEN

Parlor Ten Pins with Elastic Cord.

Croquet balls. In another a miniature alley four or five feet long is used, which can be placed on a table. The pins are about three inches high and the balls the size of mar-

bles. In still another, a post stands by the side of the pins with an arm projecting over them, and from the arm a ball is hung by a string. The player swings the ball against the pins so as to overturn them. In Germany this is played as a lawn game, the post being two or eight feet high and the pins ordinary ten-pins. It is called there *Wurfkegel-spiel* (Throw-Bowling). In another form the pins stand on a triangular frame which can be placed on a table. The ball is fastened to one of the angles of the frame by an elastic cord. The player holding the ball stretches the cord about fifteen feet and then releases it, so that the ball will strike the pins. Another kind is

played on a board like a BAGATELLE board, the balls being moved by a spring. In all these forms of the game the method of scoring may be the same as in regular Ten Pins, or a special method may be agreed on by the players before the game.

History. — The game of bowls, still a favorite in England and Scotland, was practiced as early as the twelfth century. It is played on a bowling-green, on which the turf is closely shaven and rolled, surrounded by a shallow trench. A small round white ball, called the Jack, is placed at one end, and the object of the players is to roll their bowls so that they shall stop near as possible to this mark. The bowls, which are of

Bowling in the 13th Century.

hard wood, six or eight inches in diameter, are not quite round, but a little one-sided (sometimes they are loaded with lead on one side), so that a peculiar twist is needed to make them go where wanted. The players are generally divided into two sides, and each man on each side has two bowls. The side whose bowls stop nearest the Jack counts one point in the game for each bowl. The number of points to be considered the game is decided before bowling begins.

The earliest form of this game is shown probably in the accompanying illustration, taken from an English manuscript of the thirteenth century, in which the object rolled at is a pin pointed at the top. The

French called this form of the game *Carreau* (paving stone), from the square stone upon which the pin was set.

Bowls was a favorite with the Dutch, and the early citizens of New York (then New Amsterdam) used to play it on the ground still called Bowling Green, near the lower end of Broadway. In Paris, the game was played on the ramparts of the city, which were hence called *Boulevards* (from *boule*, a ball), a name now given to the streets that occupy their site. Bowling alleys were first built at noblemen's houses in England. Henry VIII. had several constructed at the Palace of Whitehall. They became popular and many were built in London, but

as they grew to be places of resort for bad characters, many laws were made against them, and finally, in 1728 they were abolished, and the statutes against them were not repealed till 1845.

Our game of Ten Pins is derived from an old English form of bowls called Kayles, Cayles, or Keiles, a corruption of the French *Quilles* (cones, from the shape of the pins)

still played in France under that name. The Kayle pins were set in a row and were of various numbers. Sometimes a stick was thrown at them instead of a ball. Kayle pins were afterwards called Kettle or Kittles pins, and then Skittle-pins, and a bowling game called Skittles is still a favorite in England. There were also other bowling games. Nine Pins, the original form of Ten Pins,

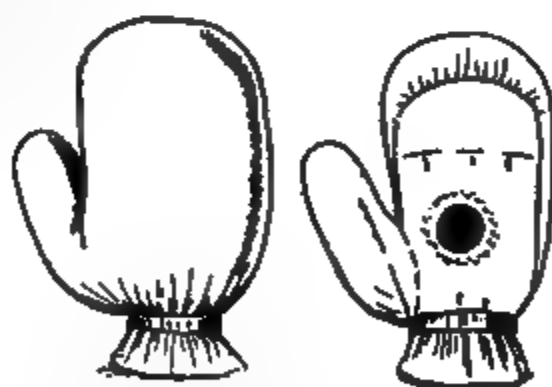
Kayles.

or the game as we play it, came into favor after the abolition of alleys in England. It was also known there as Long Bowling and Dutch Rubbers. The tenth pin is said to have been added to evade a law prohibiting the sport because it was used for gambling.

There are a few ten-pin alleys in London, but this form of the game is not played much outside of the United States. There has recently been a great revival of interest in bowling in some parts of the Eastern States. Near New York many places have regular bowling clubs, which are sometimes formed into county leagues, and play regular series of games annually for the championship.

BOXING, the art of fighting with the fists. The boxer's hands are usually covered with gloves padded on the back with hair two or three inches thick to prevent injury from a blow.

Correct Position. The boxer usually stands with his left foot advanced, and on a line with his adversary, his right being in the rear and turned



Boxing Gloves.

slightly outward, resting his weight chiefly on the right leg. The fists are closed, not too tightly, and the arms are held as shown in Fig. 1.

Advancing and Breaking Ground. In advancing the right foot is never put before the left, as in walking, but follows it, falling nearly on the place

from which the left was raised. Thus in advancing and retreating the two feet keep at about the same dis-

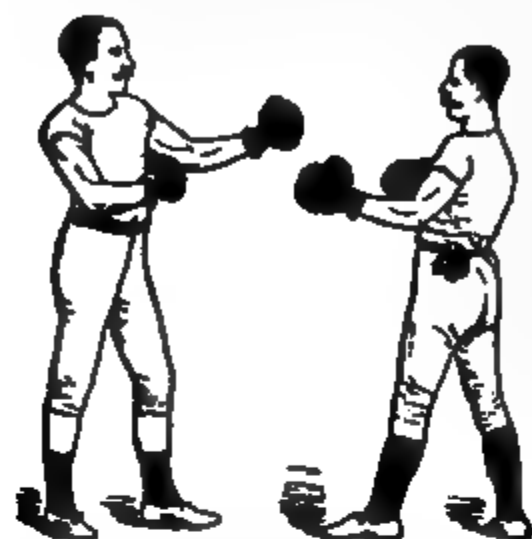


Fig. 1.

tance. Retreating is called "breaking ground," and is always performed by first moving the right foot backward and then drawing the left back to the place just occupied by the right.

Fig. 2.

Both on Guard. The boxers stand so facing each other that the left fist of one is on a level with the other's wrist and their left toes are 15 to 18 inches apart. The left hand is used for striking when the opponent is just within distance, and the right when he is close. A skillful boxer makes his blows from the

shoulder, and renders them more effective, when he wishes, by throwing the weight of his whole body forward (Fig. 2). Blows made by swinging the arms like a windmill should never be used by a beginner. The learner should take care never to hit fiercely when out of distance, as it jars the muscles. The left foot and hand should be kept well in front, and after delivering a blow the boxer should move to the right, thus keeping away from his opponent's right arm.

Guards.—Blows may be met by "guarding" or "stopping." The former means receiving an adver-

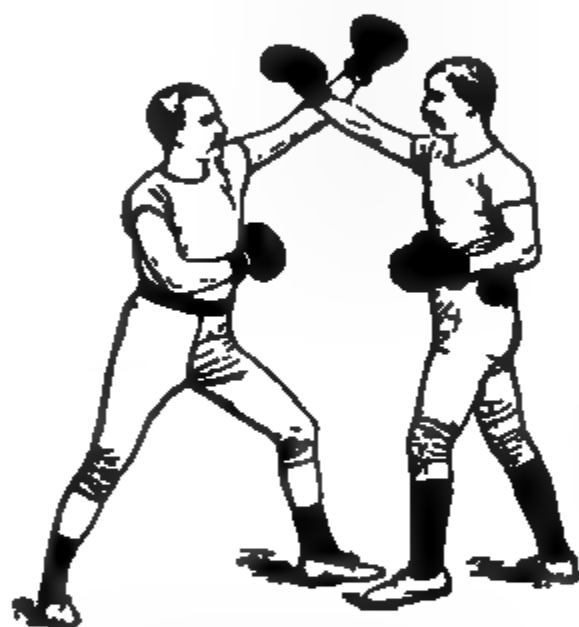


Fig. 3.

sary's blow on the right or left arm as the occasion demands, the latter is planting a sudden blow which prevents the opponent's hit from reaching its destination. Thus, if the boxer sees that his enemy is about to deliver a body-blow with his left, he may guard with the right, or stop the intended hit by delivering a quick blow at the adversary's face before he can get his head down, which would be his natural position in delivering the blow. In guarding the blows should be caught on the muscles of the forearm slantingly, and never, if possible, on the bone.

To be a skillful boxer it is best to

take lessons of one who is proficient in the art, as it is difficult to teach it on paper.

The four principal blows made use of in boxing, with their recognized guards, will now be described. They are

1. Left hand at the head.
2. Left hand body-blow.
3. Right hand at the head.
4. Right hand body-blow.

The first is met by leading off in like manner at the opponent's head, at the same time throwing up the right or guard arm to catch his blow (Fig. 3). Care must be taken not to obstruct the sight, for the boxer must never take his eye from his opponent. Each boxer thus makes the same blow (Fig. 4), and the same guard at once. This movement, which is very common, is called the "double lead and stop."

Fig. 4.

In guarding the left hand body-blow, the boxer should bear in mind that it will fall on his left side and therefore must be taken on his left arm. The right arm must therefore be put up at once and the left arm dropped across the body, keeping the elbow well into the side and the forearm braced firmly against the ribs. As the blow is taken the boxer should "break ground" a little.

For a right hand blow at the head the usual guard is to raise the left elbow quickly, pointing it nearly in the direction of the coming blow, and at the same time drop the left fist toward the body, turning the palm a little outward. Leaning forward the boxer catches the blow on the forearm, near the elbow, and at the same time retires slightly.

To guard the right hand body-

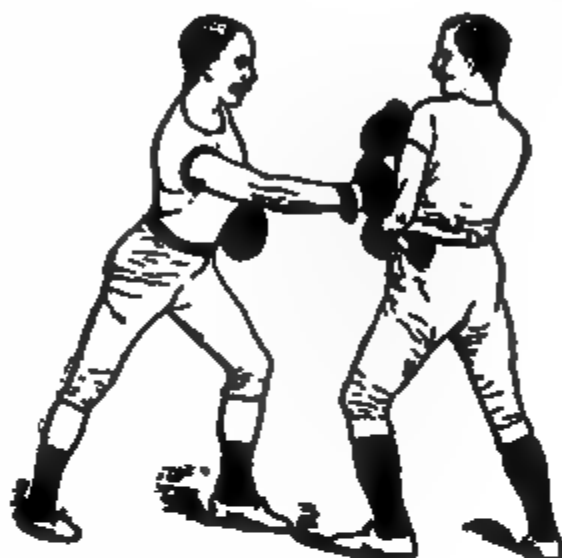


Fig. 5.

blow, the left hand is dropped almost at full length, the fist touching the inner side of the left thigh, and at the same moment the shoulder is raised quickly toward the chin rounding the whole upper arm over the chest, and slightly turning the left side (Fig. 5). The heart and the whole of the left side are thus completely shielded.

Feinting, pretending to strike one blow when another is intended. A feint may be made by an actual movement of the hand, or simply by glancing at one place and then striking at another.

Ducking. A movement of the head in sparring, called "head-work" or "ducking," generally accompanies a counter (explained below), the head being bent toward the hand which delivers the counter. The rule is always to duck in the opposite direction from the enemy and not to raise the head till the boxer is out of

his reach. There are three distinct "ducks."

1. The duck to the right, allowing a blow to pass by the left ear (Fig. 6).

Fig. 6.

2. To the left, letting a blow pass to the right.

3. Forward, lowering the head so that the blow passes directly over it. (Fig. 7).

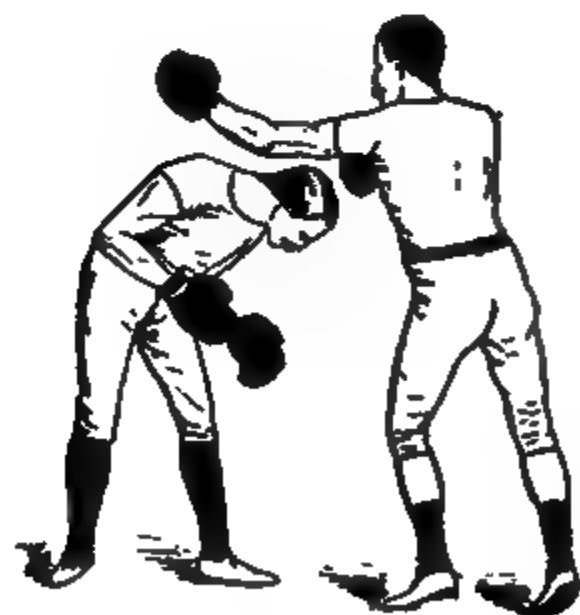


Fig. 7.

The boxer must be careful not to duck too soon, or his opponent will

have time to change the direction of his blow. When ducking the opportunity should always be taken to deliver a blow at the same time.

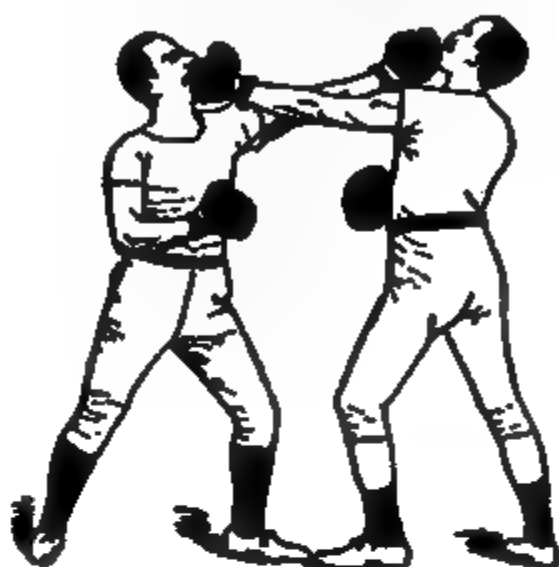


Fig. 8.

Counters. A "counter" is a blow given by a boxer when he sees his adversary about to strike, and is accompanied by a motion to ward off

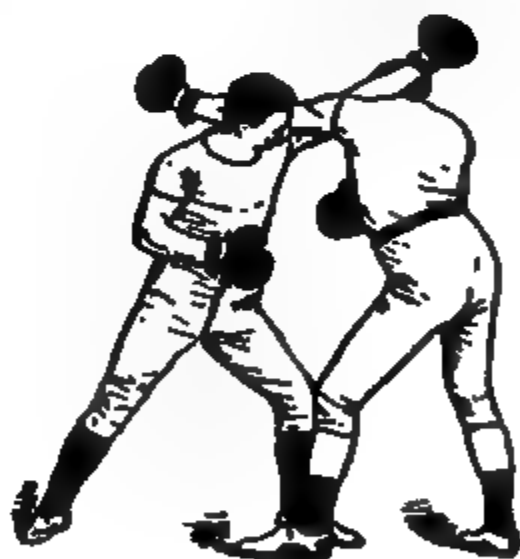


Fig. 9.

the opponent's attack. In a "plain" or "straight" counter both boxers strike at once with the same hands. The blows may both take effect (Fig. 8) or both men may duck (Fig 9). In a "cross counter" as one boxer leads off the other strikes across the former's arm. The right hand cross-counter is given by

stepping in 10 to 15 inches as the opponent leads at the head, ducking to the left, turning the body so as to bring the right arm well up, and striking with it over the opponent's outstretched left. The blow is naturally delivered upward at the jaw or chin, and the fist performs a quarter circle to the left (Fig. 10). To master this blow constant practice and great agility are required.

Body-Blows. Though the head and face are the main points of attack, the boxer should never let pass an opportunity to strike his adversary's chest or stomach. Such op-

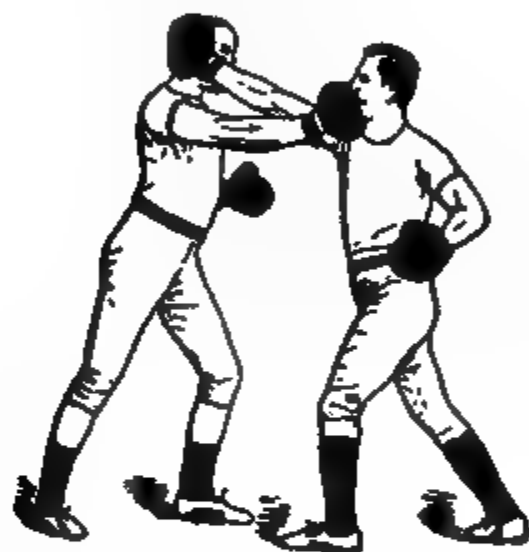


Fig. 10.

portunities will generally offer when the opponent is leading at the head with either of his hands. When he does so, instead of ducking, guarding or countering at his head, the boxer should aim a blow at his body, but as this necessitates stepping in closer, it should be certain that there is plenty of room behind for a retreat. A feint at the head, when a body-blow is intended, often causes the opponent to throw up his right arm, thus exposing himself. In giving a left hand body-blow, duck to the right (Fig. 6); in a right hand blow to the left, to avoid a possible counter. The right hand blow does not require such a long step forward as the left.

Upper Cuts. These blows should always be given when an opponent, trying to get in a body-blow, lunges forward with head in advance of his body. Drop the left fist a little and draw the arm back as far as possible;

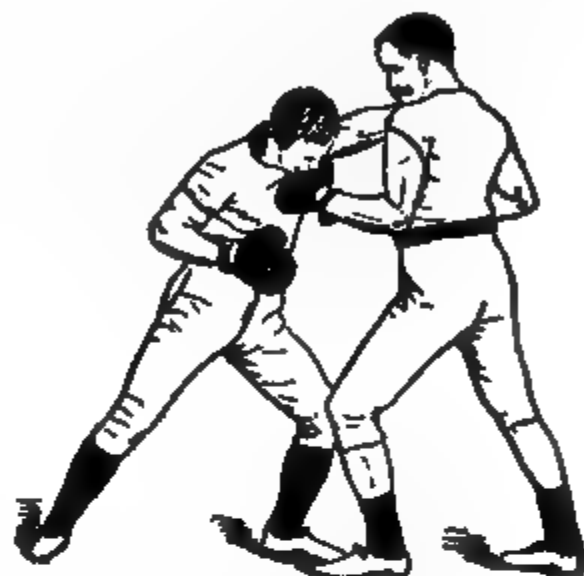


Fig. 11.

then swing it up quickly between the opponent's hands so as to strike his chin or nose (Fig. 11). The blow is aided by swinging the body upward.

Fig. 12.

A skillful boxer often tempts his adversary to try an upper cut by throw-

ing his head forward, and then, ducking, gives a heavy left hand body-blow, so an upper cut should rarely be tried against a clever adversary.

Side Step. This is executed by ducking smartly to the right as the opponent steps in, passing rapidly under his left arm by a movement like a run and jump combined, and facing him again by turning sharply to the left. This is an effective way of avoiding furious rushes, but must be as quick as lightning, and requires long practice. In Fig. 12 the boxer on the right is just getting out of reach by the side step.

In-Fighting. This takes place when a boxer succeeds in getting both his arms inside his opponent's, when he can give several blows in rapid succession, striking by swinging the shoulders forward and not by drawing the arm back (Fig. 13).

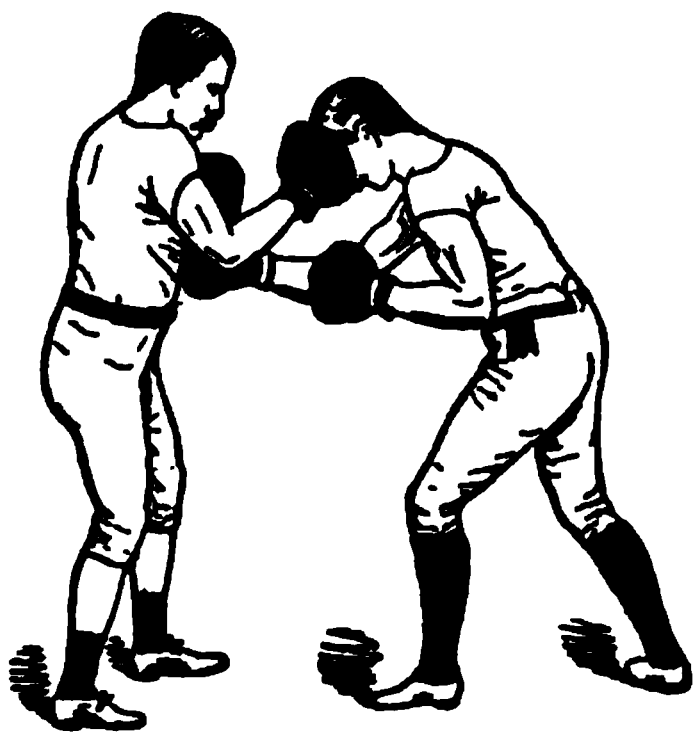


Fig. 13.

Sometimes a boxer leads with two blows in succession, striking with left hand at the face, for instance, and then with the same hand, or with the right hand, at either face or body.

The beginner should practice each blow and guard separately, slowly at first, and then increasing in rapidity, returning to the position of guard after each blow.

The boxer should avoid getting excited, should fix his eyes on his op-

ponent, and should try to tell by his movements what his intentions are. He should never do the same thing twice in succession. In some boxing contests wrestling forms a part, but in others it is forbidden. In general a boxer should avoid getting to close quarters with a heavier adversary, and with a taller opponent should direct his blows at the body.

Supplementary Exercise. Practice with Indian clubs and dumbbells (see GYMNASTICS) is good for the boxer, but his special exercise is that known as "punching the bag." Three kinds of bags are commonly used; the first or heavy bag, weighs 10 to 20 pounds and is made of chamois skin or kid stuffed with horse-hair. It is suspended from the ceiling by a rope. The method of using it is to set it swinging and then follow it about, hitting it as it moves away from the boxer. The heavy bag should not be used by a beginner. The light or flying bag is of inflated India rubber. The object is never to let the bag get past without hitting it, and as it flies about very rapidly, this is excellent training for quick movement. The third bag is the one most generally in use. It resembles the flying bag, but is attached to the floor as well as to the ceiling and does not require quite as much agility to hit.

Boxing is valued highly as an exercise and also because it trains the learner to use his fists in his own defence, which he may at some time or other have occasion to do. Thomas Hughes, in his story of "Tom Brown's School Days at Rugby," says: "Learn to box then, as you learn to play cricket and football. Not one of you will be the worse, but very much the better for learning to box well. Should you never have to use it in earnest, there's no exercise in the world so good for the temper, and for the muscles of the back and legs." Boxing matches now form part of many of the indoor meetings of athletic associations.

RULES.

The following are the boxing rules of the National Amateur Athletic Union :

1. In all open competitions the ring shall be roped, and of not less than 12 ft. or more than 24 ft. square.

2. Competitors to box in light boots or shoes (without spikes) or in socks.

3. Weights to be bantam, 105 lbs. and under ; light, 135 lbs. and under ; middle, 158 lbs. and under.

4. In all open competitions the result shall be decided by two judges, with a referee. A timekeeper shall be appointed.

5. In all competitions the number of rounds to be contested shall be three. The duration of the rounds in the trial bout shall be limited to three minutes each. In the " finals " the first two rounds shall be three minutes each, and the final round four minutes. The interval between each round shall be one minute.

6. In all competitions, any competitor failing to come up when time is called shall lose the bout.

7. Where a competitor draws a bye, such competitor shall be bound to spar such bye for the specified time, and with such opponent as the judges of such competition may approve.

8. Each competitor shall be entitled to the assistance of one second only, and no advice or coaching shall be given to any competitor by his second, or by any other person, during the progress of any round.

9. The manner of judging shall be as follows : The two judges and the referee shall be stationed apart. At the end of each bout each judge shall write the name of the competitor who, in his opinion, has won, and shall hand the same to an official appointed for the purpose. In the cases where the judges agree, such official shall announce the name of the winner, but in cases where the judges

disagree, such official shall so inform the referee, who shall thereupon himself decide.

10. The referee shall have power to give his casting vote when the judges disagree, to caution or disqualify a competitor for infringing rules, or to stop a round in the event of either man being knocked down, provided that the stopping of either of the first two rounds shall not disqualify any competitor from competing in the final round. And he can order a further round, limited to two minutes, in the event of the judges disagreeing.

11. That the decision of the judges or referee, as the case may be, shall be final.

12. In all competitions the decisions shall be given in favor of the competitor who displays the best style and obtains the greatest number of points. The points shall be : for attack, direct clean hits with the knuckles of either hand on any part of the front or sides of head, or body above the belt ; defense, guarding, slipping, ducking, counter-hitting, or getting away. Where points are otherwise equal, consideration to be given the man who does most of the leading off.

13. The referee may, after cautioning the offender, disqualify a competitor who is boxing unfairly, by flicking or hitting with the open glove, by hitting with the inside or butt of the hand, the wrist or elbow, or by wrestling or roughing at the ropes.

14. In the event of any question arising not provided for in these rules, the judges and referee to have full power to decide such question or interpretation of rule.

History. Boxing was said by the Greeks to have been invented by Theseus ; and Pollux, Hercules, and other Greek heroes are described as excelling in it. It was one of the important features of the Olympic games (C. P. P., article OLYMPIA.) Instead of boxing gloves, the ancients

used the *cestus*, an arrangement of leather strips wound around the hand and sometimes up the arm as far as the elbow. These were sometimes loaded with lumps of lead and were very dangerous. In ancient boxing contests the right arm was used chiefly for striking and the left for warding off blows.

The Romans liked to look at exhibitions of boxing, but considered it undignified to take part in them. Boxing was revived in England in

favor principally in England and the United States.

Savate. The French are not skilled in the English system of boxing, but practice a kind called *Savate*, in which the head and feet, as well as the fists, are used for attack and defense. It is said that those skilled in the method have defeated some of

Savate.

the best English boxers, whose guards, though perfect against a blow from the fist, would often be no defense at all against one from the foot. The sailors of the French navy are trained every day in *Savate*, in which they are very expert.

BREATH FIGURES, Experiments on. 1. Trace a figure with the finger on a pane of glass. Nothing will be seen until the plate is breathed on, when the figure becomes visible.

2. Lay a coin on a freshly polished plate of glass or metal. After several minutes remove the coin and breathe on the metal, when an image of the coin will appear. The result will be the same if the coin is polished instead of the plate on which it is laid.

3. Breathe on the surface of a pane of glass which has been in contact for several years with an engraving. In many cases the lines of the engraving will become visible on the glass.

Explanation. On the surface of all solids gathers a layer of gas, vapor, and fine dust, which is removed by polishing and altered by

Cestus.

the eighteenth century, when it began to be called "the noble art of self-defense." A teacher of boxing named Broughton, who is said to have invented the boxing-glove at this time, gave public exhibitions of his skill in a theater, which he built for the purpose. Boxing contests without gloves, called prize-fights, were also held, but they became so brutal that laws were passed against them, and at present boxing is practiced by respectable people only as a form of athletic exercise. It is in

the contact of other solids. If the object be breathed upon the breath will condense more easily on some parts than others, according to the state of this layer, and any marks made on it will hence become visible.

BREATH PORTRAITS. To finely powdered fluor spar add enough sulphuric acid to make the mixture of the proper thickness to be used as ink. With a quill pen, write or draw with it on the surface of plate glass. After the fluid has been on the glass five to ten minutes wash it off with water. The surface of the glass under it will be slightly eaten away, but so little that it will not be noticed unless the glass is breathed upon, when the design or writing will stand out clearly. The effect is very striking.

BROTHER, I AM BOBBED, a trick, in the form of a game, in which any number of persons take part. Two persons, to act the part of "brothers," are selected, of whom one must not have played the game before. The brothers are blindfolded and kneel back to back, and the other players stand around them in a circle, each with a knotted handkerchief. The "brother" who does not understand the game is told that the players are to hit one of the brothers with a handkerchief from time to time, and the one hit is to cry out "Brother, I am bobbed!" The other must then respond, "Who bobbed you?" and the first must guess who hit him. He is told that if the guess be correct the person who struck him will have to change places with him. When the game has begun, however, the "brother" who knows the trick removes the handkerchief that covered his eyes, and, knotting it, strikes his companion. When asked, "Who bobbed you?" the latter of course makes a wrong guess. This is kept up till the victim suspects that he is deceived. The "brother" who knows the trick should occasionally cry out "Brother, I am bobbed," to keep up the illusion.

In France this game is called "*Frère, on me bat*" (Brother, some one strikes me).

BRUNETTE AND BLONDE, a SOLITAIRE game of CARDS, played with two packs. The first eight cards played are laid in a row, and on each of them are placed others in descending order, but of different color alternately. Thus, on a red nine a black eight must be placed; on this a red seven, and so on. Whenever the Aces appear they are placed in a row by themselves, and on them are built families in ascending order, without regard to suits, except that no card must be placed on one of the same color. The families may be built up by using cards as they come from the pack, or the top cards of the piles. All cards that cannot at once be used are laid aside to form stock, which can be shuffled and relaid twice. If the families can be completed thus, the player wins.

BUCK, a game played by two person, one of whom places his arms across his breast, or rests them on his knees, and bends forward, resting his head against a fence, tree, or wall. This is called "giving a back." The other player sits astride the back of the first, and holding up one or more fingers, says, "Buck, Buck, how many horns do I hold up?" The first player guesses, and if his guess is correct the two change places; but if the guess is wrong, the rider gets down, leaps on again, and holds up one or more fingers again with the same question. So the game goes on as long as the players choose. The "buck" is sometimes blindfolded, and a third person often acts as umpire, to see that there is fair play.

History. This game is very old. Petronius Arbiter, a writer in the time of the Roman Emperor Nero, describes a man playing it with a boy. The boy "mounting as on horseback, smote his shoulders with his open hand, and laughing said, '*Bucca, Bucca, quot sunt hic?*'" (Bucca, Bucca, how many are here?)

In another form of the game, a child hides his head in another's lap, and the latter says :

" Minglydy, mingledy, clap, clap, clap,
How many fingers do I hold up? "

or some similar rhyme. The game, in all its forms, is probably related to MORA.

In France a game resembling this, called *Les Metiers* (The Trades), is played. The player who makes the back chooses a trade and the name of something connected with it, for instance, shoemaking and wax. The trade is announced, but the article kept secret. Each player in turn must then say, as he mounts the back, " A good shoemaker must have good leather," or "good pegs," or anything else he pleases. Whoever mentions the word chosen by the player who makes the back must take his place.

BURIED WORDS, a game played by two or more persons, one of whom gives a sentence in which a word is concealed by being formed partly of one of the words in the sentence, and partly of one or more immediately following. Thus the word "London" is concealed or "buried" in the sentence, "Do not let the rain fall on Don Carlos," as will be seen if the proper letters be capitalized, thus, "Do not let the rain fall ON DON Carlos." The one who gives out the sentence must state that the buried word is the name of a city, person, flower, article of food, or whatever it may be, and the first one who guesses it correctly scores a point. The guesser then gives out another sentence, and the game goes on for any length of time agreed on, or till some one has scored a certain number of points. After a little practice words can thus be buried very skillfully. The hardest ones to guess are those in which pronouncing the words gives no clew. Thus in the following, "buried fruits," the former can be guessed by pronouncing the sentence slowly, while the latter cannot :

"Some fairy OR ANGEL must have done this." "The baboon and aPE ARE both curious animals."

The best plan in burying a word is first to see whether it contains another word within it. Thus in burying the word "Orange" it is seen that the word "rang" is so contained. A sentence must now be constructed with the word "rang" in it, while the word just before must end with "O," and that just following begin with "e." Thus: "They danced a fandango, rang Edward's door bell, and behaved very wildly." It will be seen that the word is thus "buried" much more deeply than in the other example given.

A somewhat similar game, played in Germany, is there called *Worte Verbergen* (Word-hiding). The title or first verse of some well-known song or poem is selected by one of the players, who, in answer to any question, returns a reply including its first word. To a second question he gives an answer containing the first two words in succession, and so on, till the line is guessed. Thus, suppose the song "A life on the ocean wave" be chosen. The following may be the questions and answers :

Q. How do you do?

A. A little better, thank you.

Q. Where do you spend the summer?

A. In the country. I enjoy a life spent outdoors.

Q. Who was your grandfather?

A. He was the celebrated Dr. Bobus, who sacrificed a life on the altar of science by visiting the North Pole.

By this time the title will probably be guessed by the repetition of the word "life." The most difficult lines to guess are of course those containing small and frequently used words at the beginning.

BUTTON, BUTTON, a drawing-room game, played by any number of persons. The players sit in a circle around the leader, who stands holding a button between his hands, the palms

of which are pressed together. The others hold their hands in the same manner. and the leader goes to each in turn, saying, "Hold fast what I give you," passing his hands between those of the player he addresses, and gives the button, while doing this, to any one of the players he chooses, but without showing to whom he has given it. When he has made the round of the circle, he says to each player in turn, "Button, Button, who has the button?" and each, as he is asked, must guess. Then the leader calls out, "Button, Button, arise," and the holder of the button stands up. This game is usually played by very young children, an older one acting as leader. In some parts of the United States a ring is used, and the corresponding verses are,

"Biddy, Biddy, hold fast my gold ring
Till I go to London and back again."

Another form used is, "Fox, Fox, who's got the box?"

BUTTONS, a game played by any number of children, each of whom has a button. The players stand in line and toss their buttons at a hole in the ground about twelve feet distant. They then take turns in playing, beginning with the one whose button came nearest to the hole, and



Method of Holding the Hand in Button.

try, by striking the buttons with the thumb as they lie on the ground (see illustration), to drive them into the hole. When any one succeeds, the

button he drives in becomes his property. When he misses, the next one takes his turn. The hand is held stiffly in playing, the thumb being extended, and the motion is made with the whole hand,

Spans, a button game played by two persons. The buttons are thrown against a wall, and if a player's button falls within a span of his opponent's he may aim at it as described above. If he strike it, he wins it. A span is the distance from the end of the thumb to that of the little finger when the hand is extended.

BUZZ, a game played by any number of persons. The players sit in a circle, and, beginning at any point, call out the numbers, one, two, three, etc., in order. Instead of the numbers in writing which the figure 7 is used, and also of those that are multiples of seven, the word "Buzz" must be spoken. Thus, Buzz must be substituted for 7, 14, 21, 27, 28, 35, 37, 42, 47, 49, and so on. For the seventies, Buzz-one, Buzz-two are used, and for 77, Buzz-buzz. Any one that mentions such a number by name, or says Buzz in the wrong place, or calls out a wrong number, must pay a forfeit, and then begin the game anew by calling out "One!" If the one whose turn it is waits longer than while any one counts five he must pay a forfeit. Buzz should not be played by seven people, for then one of them would always have to say buzz when his turn came.

Buzz-Fizz, the game of Buzz, with the addition that every multiple of three is called "Fizz," of five, "Quack," and of eleven, "Cock-a-doodle-doo." Where a number contains two or more of these as a factor the names of all the factors are given, the smallest first. Thus, 15 would be "Fizz-Quack"; 77, "Buzz-cock-a-doodle-doo"; and 105, "Fizz-Quack-Buzz."

C

CACHINOLE. See SQUAILS.

CALABRASELLA, a game of cards played by three persons, with a pack from which the tens, nines, and eights are excluded. Each player is dealt twelve cards, two at a time, and the four remaining in the stock are placed face downward on the table. After the deal, the eldest hand has the choice of "passing" or "playing." If he say "I pass," the player at his left has the same option, and so on. If all pass, the hand is abandoned and the deal passes to the left. The first player who says "I play," must play against the two others as partners. Before he plays he may ask for any Three he chooses, and the holder must give it to him, receiving a card in exchange. If no one has the Three asked for, he must not demand another, but if he have all the Threes in his own hand at the beginning of the game he may ask for a Two. He then discards from one to four cards and selects an equal number from the stock, first announcing the number of cards he will put out. He must discard at least one card, and must show to the other players the cards he takes in. The playing then begins, the eldest hand having the lead. There are no trumps, and suit must be followed if possible. In playing, the cards rank as follows: Three (highest), Two, Ace, King, Queen, Knave, Seven, Six, Five, Four (lowest). The winner of the last trick takes also the discard (including any cards of the stock that are left). Each Ace taken counts the winner of the trick 3 points, and each Three, Two, King, Queen, or Knave, 1 point. The last trick counts 3 points. Either side scores what it has made in excess of the other side, each of the partners scoring the whole number of points made by their side. Thus, if the partners have 22 points and the

single player 13, each of the former scores 9 points. The number of points to be played for is agreed on before the game.

The eldest hand should say, "I play," if he have a fair hand. Try to win as many counting cards as possible, especially Aces, which it must be remembered may be taken in play by either Threes or Twos.

RULES OF THE GAME.

1. The players cut for deal, and the lowest Calabrasezza card deals.

2. In case of a misdeal, the same player deals again.

3. If the Discard contain too few cards the partners may either throw up the hand or require the single player to correct the mistake; if it contain too many, the single player loses the tricks to which he cannot play.

4. If the single player demand a Two when he has not all the Threes, the partners may throw up the hand if they choose.

5. If a card is asked for and not obtained, and it is found not to be in the stock, the single player may ask for it again and then alter his discard.

6. If the single player expose a card, or lead or play out of turn, there is no penalty, but the mistake must be corrected unless the trick has been completed. If one of the partners expose a card, the single player may call on him to play it at any time. If either of the partners lead out of turn, and the error is discovered before completing the trick, the single player may call on the right leader to lead a particular suit; or, if it is his own lead, he may thus call a suit at the first opportunity.

13. If a player revoke, he must forfeit nine points.

14. No trick can be looked at after it is taken.

CALIFORNIA JACK. See ALL FOURS.

CALISTHENICS. See GYMNAS-
TICS.

CALL-BALL, CALLIE BALL, or BALLIE-CALLIE, a game of ball played by any number of persons, with a hard rubber ball. The ball is thrown against a wall by one of the players, who at the same time calls out the name of one of the others. The player named must strike the ball as it bounds back, calling another name as he does so. If he miss it he must pick it up, and call "Stand!" whereupon the other players, who have begun to run as soon as he makes the miss, stand still. He throws the ball at one, and if he strikes him that one must throw the ball at the wall, as before. If he miss the player at whom he throws, he must place himself against the wall while the others throw the ball at his back in turn, as in ROLY POLY.

This game was common in New England many years ago, and is still played in Austria. The English poet Herrick alludes to a similar game in his lines:

"I call, I call; who doe ye call?
The maids to catch this Cowslip ball."

In the Middle Ages boys and girls played a kind of call-ball where he who obtained possession of it threw it to the one he loved best.

CAMERA LUCIDA, an arrangement to aid in drawing the outline of small objects. There are several kinds, but the simplest is made as follows:



Fig. 1.

Sit at a table in front of the object, which should be supported on a book (Fig. 1). Lay a sheet of white

paper on the table between yourself and the object, and on the farther edge of the paper rest the edge of a pane of glass. Incline the glass toward you, and presently you will see in it the reflection of the object to be drawn. At the same time you will see the paper through the glass. The glass may now be rested against a book to keep it in position. Hold your pencil on the paper under the glass and see whether you can see the reflection and the pencil point plainly at the same time. If either of them looks double while you are fixing your eyes on the other, it shows that the object is either too far away or too near. Move the book on which it rests backward and forward until you can see both the reflection and the pencil point plainly. Keeping the eye perfectly



Fig. 2.

still, the outline of the reflection can now be followed on the paper with the pencil, and thus a very exact picture can be drawn. The picture will be of the same size as the object, hence only small objects, like flowers, insects, coins, or small wood-cuts, can be used. To draw large objects or landscapes by tracing in the same way, a CAMERA OBSCURA may be used, as in PHOTOGRAPHY, but a large Camera Lucida is sometimes arranged as in Fig. 2. The words CAMERA LUCIDA are Latin for Light Chamber.

CAMERA OBSCURA. To make a rough camera, take a little paste-

board box (Fig. 1), like those in which pens are sold, and make a pinhole in the middle of the cover, working the pin about **A** to enlarge the hole a little. Remove one end of the cover, and in the corresponding edge of the box cut a notch just large enough to see through into the box when the cover is on. On a sunny day, hold the box with the pinhole toward any bright object and look down into the end through the notch, holding the eye close, so that no light can get in except through the pinhole. A picture will be seen on the back of the box, inside, in which the bright parts of the landscape can be eas-



Fig. 1.

ily distinguished. The picture will grow clearer as the eye becomes accustomed to the light. By moving the box so that the pinhole turns in a different direction, the picture will change. The smaller the pinhole is, the less blurred the picture will be, but it will be also less bright. With a hole about $\frac{1}{8}$ of an inch in diameter the picture will be quite bright, but so blurred that it is hard to tell different objects from each other. The box should not be more than an inch deep, as the farther the back is from the pinhole, the less distinct the picture will be. In the evening, such a camera will give an excellent picture of a lamp or candle, and even of a person's face held very near a bright light. The way the picture is made may be understood by looking at Fig. 2, where the lines rep-

Fig. 2.

resent rays of light from different parts of an object passing through the pinhole and striking the back of the box. When the cover is taken from the box, rays from all parts of the object strike every part of the box at once and are mixed together, hence there is no picture, but only a white blur.

A camera which will make the picture bright without blurring it may be made by using a glass lens (See LENSES, EXPERIMENTS WITH). These experiments show how a lens will throw a picture, and the picture can be seen to better advantage if the lens be fixed in a hole in the side of a box. The observer may work at the picture through a hole in the top

of the box, or the back of the box may be made of thin white paper, so that the picture will show on the other side. There is a certain distance from the lens for every object, where its image will be plainest, so it is a good plan to make the back of the box so that it can be slid in and out. Find the distance at which the lens makes the plainest picture of near objects before choosing the box, and then select one of the right depth. Remove the back, and saw off the edges so that it can be made to slip in as far as desired. Nail a stick to it to serve as a handle by which it may be pulled in and out.

Hat Camera. A camera can be made also from a stiff felt or silk hat,

if it have a ventilating hole in the top of the crown. If there are more than one of these holes, all but the central one may be stopped with paper. A piece of thin paper is then pinned over the bottom of the hat, which is held with the top toward the part of the landscape to be observed. A black shawl is thrown over the hat and the observer's head, but care must be taken that it does not hang over the ventilating hole.

CAMPBOR. Experiments with.
1. Place a piece of gum camphor on water. After a time it will begin to move about on the surface, and will continue its motion till it is dissolved. The reason is that it dissolves more rapidly at some places than at others, so that the surface of the water pulls more strongly on it in one direction than in another. The bit of camphor may be set on fire, and will then burn as it moves about.

2. Dust lycopodium powder over the surface of a dish of water by shaking it in a muslin bag. The water should be covered with a very faint layer of the powder. Dip into the water the end of a rod or stick of gum camphor. The lycopodium at once moves back from the camphor, and begins to revolve in several wheel-shaped figures.

In order that this experiment may succeed the vessel and water must be quite clean, and the day should be dry and fine, so that the camphor film will evaporate soon after it forms.

3. Dissolve a bit of camphor the size of a pea in a drachm of benzine. Keep the solution in a phial in whose cork a pin is stuck, head downward, so that it protrudes into the liquid. Fill a concave microscope slide with clear water, and touch the surface with a little of the benzine-camphor liquid on the head of the pin. The drop, viewed through the microscope, behaves very curiously, little drops detaching themselves from its sides and moving about in all directions.

4. Pour a thin layer of water into a flat-bottomed shallow dish. Cut a

rod of gum camphor one-quarter inch square, following the grain of the gum, which can be seen on holding it up to the light. Touch the bottom of the vessel with this stick, and the water around it will be thrown into waves or ripples, which will continue till the end of the stick is dissolved away. The reason is that the water is first drawn up toward the stick as it would be toward the finger or a glass rod. But, a film of camphor forming on its surface, this is altered so as to act toward the stick as mercury would toward glass, that is, the water is depressed. It recovers itself, and the action goes on very rapidly.

5. Place a piece of gum camphor in a tightly stoppered bottle, and let it stand awhile in a warm room. Then set it close to a window and the side next the window will become covered with minute camphor crystals. This is because the camphor evaporates, and the coolness caused by the window condenses the vapor again. It was once thought that the light influenced the crystallization, but it will take place at night in the same way. Marks on the glass, invisible before, will often be shown by the arrangement of the camphor crystals, just as those on window panes often are by frost crystals. Thus, if the interior of the bottle be wiped out roughly with a moist cloth, and then allowed to dry, the crystals are apt to form along the lines made in wiping. (See also BREATH FIGURES.)

CAMPING OUT. One kind of camping may be in connection with a WALKING TRIP, the campers spending their nights in a tent instead of at a hotel or farm-house, and preparing their own meals. Each person may carry about twenty pounds of luggage in a knapsack or haversack, or in a roll, whose ends are joined to make a ring which is thrown over the shoulder, as shown in the illustration. Each should take a rubber blanket, a woollen blanket, a change of clothing, towel,

soap, comb, and toothbrush, besides his share of the general luggage, which includes the tent, cooking utensils, hatchet, and food. An easier but more expensive way is to have all the luggage carried in a wagon, leaving the walkers free. A larger tent and more implements can thus be carried, and the expense is usually not great if divided among several. It is often a good plan to buy a horse and cart for such an expedition, selling both at the end of the journey. If the camp is not to be moved, the tent may be still larger, and many useful fixtures, such as

including himself, once went on a twelve days' camping trip and spent but one dollar apiece during that time. They "carried coffee, sugar, pork, and beef from home, and ate potatoes three times a day." Frank E. Clark, in an account of three weeks' camping on the seashore, gives the following list of expenses for six persons:

Tent for three weeks . . .	\$ 9.00
Provisions taken with us . .	22.00
Stove and cooking utensils .	15.00
Fresh provisions bought at the beach	15.00
Incidentals	20.00

Total \$81.00
or \$4.50 per week for each camper.

In general, the expense depends almost entirely on the way in which the campers are willing to live.

GIRLS' CAMPS. What has been said above applies also to campers of the other sex, or of both sexes, except that ladies must not be expected to bear any hardships. A party of girls, in charge of an older woman may camp together very pleasantly in not too wild a country, hiring a man to do the hard work, such as pitching the tent. When the campers are of both sexes, the ladies will naturally be allotted the cooking and other housework, while the men do the rougher work.

Insects. Campers are often annoyed by mosquitos and black flies, especially in the woods, and, where these pests exist, mosquito netting must be taken for protection at night. Many preparations for keeping insects away by applications to the face and hands are to be bought, but most old campers prefer to drive them away by making what is called a "smudge." A fire is built to windward of the camp and smothered with wet wood and damp leaves, so as to make a dense smoke. The "smudge" is disagreeable, but is a welcome relief after insects.

Rainy Days. If the rain is a cold

Fig. 1.—The Camper—Loaded.

tables, a stove, an oven, bedsteads, etc., can be set up by any one of ingenuity.

Location. A camp should be on dry ground, sloping so as to give drainage, and near good drinking water. Favorite sites are on mountains, at the edge of woods, on the bank of a lake, or on the seashore.

Expenses. These vary at the pleasure of the camper, and according to the number in the party. Mr. John M. Gould, in his book on "How to Camp Out," relates that three boys,

one, it is often necessary to build a fire just outside the tent, but it is difficult to keep one alive in a hard storm. If there is a stove in the camp, it may be brought inside the tent, the pipe projecting through the door, but unless this is on the leeward side the smoke will be blown back into the tent. Another way is to build a fire in a hole just outside the tent and conduct the smoke through a trench under the tent, covered with flat stones, the crevices being cemented with clay. It is difficult to make this smoke-tight, but when it is so, it warms the tent well.

Each one of the campers should have his special duties assigned him. This may be done on trial at first, till it is seen for what work each is best fitted. Thus, in a camp of three, one may do the cooking, and another the dishwashing, while the third has general charge of the tent and its surroundings.

Tents. The material is usually heavy drilling or duck for large tents. The simplest kind is a Shelter-tent, which consists merely of pieces of cloth with buttons and buttonholes at the edges, by which several can be fastened together. The buttonholes are near the edge, and the buttons several inches nearer the center. The pieces carried by the soldiers of the United States army in the Civil War were about five feet square. They can be fastened to-

uprights, and fastening them at the bottom, by driving pegs through the buttonholes, or through loops of rope sewed there for the purpose. If two more pieces be buttoned across the ends, the tent is entirely inclosed. The tent poles and pegs are not carried, but cut at the spot where the tent is pitched. A shelter-tent (Fig. 2) is the best to use where the campers walk from place to place and carry all their own baggage. An end piece may be made to fit the end exactly, and sewed to one of the side pieces instead of buttoning it, if desired. The tent should usually be pitched with a right angle at the roof, but the angle must be sharper in rainy weather. Shelter-tents may be made also of rubber, which are perfectly waterproof, but heavy to carry.

An A tent, or Wedge-tent (Fig. 4) is pitched over a ridge pole like a shelter-tent, but is made all in one piece. A common size is about seven feet high, seven feet long, and eight feet wide. One end is usually closed, while the other has an opening in the middle, closed by a flap hanging on the inside. Around the bottom of the tent is sometimes hung a strip of cloth called a sod-cloth, to keep out draughts and prevent the edge of the tent from touching the ground and rotting. Around the edge are also sewed loops of rope called "becketts," through which wooden pins (Fig. 3) are driven into the ground, when the tent is pitched.



Fig. 3.
Tent Pin.

The best tent for a permanent camp, or one where the heavy luggage is carried from place to place on a wagon, is the Wall-tent (Fig. 5). This is shaped like a house, with side walls about four feet high, and ridge pole about nine feet from the ground. At the corners of the eaves and at every seam along their sides loops of rope are fastened, and

Fig. 2.—Shelter Tent.

gether, and put up in various ways; for instance, by throwing two over a ridge pole supported on two forked

through each of these is passed a rope called a "guy," about ten feet long, knotted at one end so that it will not slip through the loop. The other end is passed around a peg driven into the ground at such a distance that the guy will have the same slope as the roof, and so keep the roof stretched. That the guys may be tightened easily, pieces of wood called "fiddles" are used, about five inches long, two inches

wide, and an inch thick, having two holes bored through them three inches apart, just large enough to admit the rope. The end of the guy is passed through one of these holes and back through the other, and then knotted. The loop thus made is passed around the peg, and the guy is then tightened by pulling up the fiddle as high as it will go. Around the bottom of the tent, which also has a sod-cloth, are beck-

Fig. 4.—"A" Tent, or Wedge-tent.

ets, through which pegs are driven. A second roof called a "fly" is used with a wall-tent to keep out the rain, since the roof is not sharp enough to shed rain by itself. It passes close over the ridge pole, but is lifted several inches above the inner roof at the eaves, and projects about a foot beyond it. It is kept stretched by guys whose pegs are driven into the ground some distance beyond those of the roof. The end poles of an A

or wall-tent should have iron pins at the top, which fit into holes in the ridge pole, and the latter should have ferrules on the ends to prevent splitting. The end poles should be made too high for the tent at first, as it stretches with use. At first, the poles can be sunk in the ground a little way to make them short enough. Tent pins should be of tough wood, and have a notch near the top to hold the rope.

A shallow trench must be dug completely around the tent, after it is pitched, to carry off the water in case of rain. If the tent is on a hillside, no trench need be dug at the lower side. In a permanent camp, a board floor may be laid in the tent.

Shelters. In the woods, shelters of poles and boughs are often used instead of tents. The simplest is made by placing a ridge pole across two forked uprights and then leaning

poles and boughs against it from one or both sides. A rustic cottage (Fig. 6) may be made by trimming the branches from four trees standing as nearly as possible at the corners of a square, leaving part projecting as a rest for cross poles, thus forming a framework. These cross poles are tied to the uprights with willow withes, and then branches are woven in by passing them inside one pole, outside the next, and so on. A roof

Fig. 5.—Wall-tent.

slanting in one direction is made in the same way and thatched with grass so as to shed water. If four trees cannot be found in the proper position, upright posts set in the ground may be substituted for one or more of them.

Sleeping. The simplest way to sleep in camp is on the ground, laying on it first a rubber blanket and then a woolen one. Evergreen boughs or dried leaves may be placed underneath

the rubber blanket to make a bed, and the whole may be raised above the ground by a bedstead of poles supported on forked sticks. One of the best camp beds is a light folding cot (Fig. 7), covered with canvas, which may be bought at a furniture store. In a permanent camp a double mattress may be laid on the floor of the tent, over a rubber blanket, making room for several sleepers. Each camper must have one rubber blanket and

one woolen one. A pillow adds greatly to comfort, but must be dispensed with if each carries his own luggage. In any case, beds and bed-

ding must be carried out of the tent and thoroughly aired every morning. Unless a mattress is used, the camper's bones will be apt to ache for one

Fig. 6.—Framework of Rustic Cottage.

or two nights, but he will soon get accustomed to his hard bed. The camper may also sleep in a hammock when the weather admits of sleeping in the open air. There is usually hardly room for one inside the tent.

Cooking. The simplest way to cook is over a wood-fire in the open air. A kettle may be hung over the fire from a cross bar resting on two forked uprights, and any food that requires boiling can thus be pre-



Fig. 7.—Camp Cot.

pared. Broiling can be done by holding the food in small pieces over the coals with sharp sticks if a grid-iron has not been brought. For

frying, the fire is built over a smooth stone, and scraped away from it when the stone is sufficiently heated. The stone is then carefully wiped, and is

usually hot enough to fry several fish, or the flat stone may be placed on the top of a fireplace made of stones, and used for cooking while the fire is under it. An oven for baking can be built of stones. Where

only by the purses of the campers and the ability of the one who does the cooking. A small stove is often necessary in a large camp, and many different kinds of camp stoves are now to be bought. A kerosene stove is always useful in making a cup of tea or coffee at short notice, or in cooking on a rainy day.

CANDLE-MAKING. Very good tapers can be made with old candle-ends, a little tin pan, such as are used for baking muffins, a lead-pencil, some tin-foil and some string. Make a mold by shaping tin-foil around the pencil. Melt some of the candle-ends in the pan by holding it over a lighted candle-end, and then pour the wax into the mold, into which a piece of string has been put for a wick. Hold the mold upright till the wax has set and then lay it aside for a few moments, after which the tin-foil can be unwound, leaving a little wax taper. Larger ones can be made by using something larger to shape the mold, an old chair-rung for instance.

A mold may be made also of a rolled sheet of note-paper tied with string, and stopped at one end with a cork. The wick should be fastened at one end to the cork with a tack, and at the other to a match or bit of wood, laid across the roll. If the mold be made thus, of paper, the tallow must be allowed to thicken a little before it is poured in, or it may soak through.

If a large candle is to be made, the tallow is most easily obtained by melting beef or mutton fat cut into bits, and skimming out the pieces of thin skin and tissue from it. If desired, wax may be melted and used in the same way.

CANDLE, Experiments with. The candle flame is described in the article FIRE (C. C. T.), and a few experiments with it are given there. Others will now be told about.

A tallow candle about an inch and a quarter in diameter is the

Fig. 8.—Stone Stove.

there is clay, one can be made by covering with it a cask or barrel embedded in a bank. A fire is built in the barrel, which both burns it away and bakes the clay hard, making the oven. Such an oven is used by first building a fire in it and then scraping the fire away, and putting in the food to be baked. In every permanent camp, an ice box should be provided for provisions. This may be made by sinking an ordinary dry goods box or barrel in the ground, and if the box is sunk deep enough, ice may be dispensed with. A hole should also be dug at some distance from the tent where all kinds of swill and refuse may be thrown and covered with earth every few days. The supply of food to be taken to camp depends largely on how much the campers expect to provide for themselves by hunting or fishing. Eggs and milk can often be obtained from a neighboring farm house. The necessities for most campers are bread or crackers, coffee or tea, sugar and salt. Where the campers walk from place to place carrying their own luggage, food must generally be bought from day to day wherever it can be obtained. Where the camp is permanent, the stock of provisions is limited in size and variety

best for these experiments, though an ordinary one will answer. Such a tallow candle may be made according to the directions in the article on CANDLE-MAKING.

Experiment 1. Take a piece of wire gauze like that used for strainers or window screens, and press it down on the candle flame. The flame will not pass through the gauze, but will flatten out beneath it, so that one can look down into the center of it. The space inside, where there is no fire, will thus be seen plainly. The reason that the flame cannot pass through the gauze is that the wires conduct the heat away very rapidly, cooling the flame so much as to put it out before it can get through.

Experiment 2. Let the candle burn till the wick in the flame is quite long and then blow it out with a quick puff. If the air is still, a stream of smoke will rise from the wick. Touch a lighted match to this smoke half an inch or so from the candle, and the flame will run down to the wick, lighting the candle again. Sometimes the smoke can be lighted an inch or more from the wick. The reason why this smoke burns, is that it is the gas which forms the candle flame, and which continues to rise from the wick for a few seconds after the flame is put out.

Experiment 3. Blow out the candle as in Experiment 2, and hold the gauze so that the stream of smoke will rise through it. Light it above the gauze, and it will run down to the gauze, but will not pass through it. (See also CARBONIC ACID, Exp. 11.)

Experiment 4. Bring a plate quickly down on the candle flame and raise it at once without moving it sidewise. The flame will leave a ring of soot on the plate. This is because the empty space in the middle of the flame deposits no soot.

Experiment 5. Place a lighted candle-end on the table and put a glass dish or goblet over it. It will

burn dim and finally go out. This is because it has used up all the oxygen in the air under the dish.

Experiment 6. Stick a lighted candle-end on a bit of wood, so that it will float upright in a pail of water. Then press a glass tumbler down over it, pushing it to the bottom of the pail. The candle will burn under water as long as it has oxygen enough. The air under the tumbler prevents the water from entering and putting out the candle. Try the same experiment, using, instead of a tumbler, a lamp-chimney with the hand held tightly over the top. After pushing it down to the bottom of the pail, remove the hand so that the water can push the air out at the top. The water will rise inside the chimney, carrying the candle with it.

Experiment 7. Thrust the head of a match very quickly into the dark center of a candle flame. It will melt but not burn. This is because there is no air in the inside of the flame.

CANNONADE, a game played on a circular board with marbles and a TEETOTUM, which can be spun like a humming TOP. Around the edge of the board are six little wooden towers called castles, protected by wires on all sides except toward the middle of the board, where about 15 marbles are placed. One of the players is chosen as Gunner, and each of the others selects a castle. Each one begins the game with an equal number of counters, and each castle-owner bets as many as he pleases on his castle. The Gunner then spins the teetotum in the midst of the marbles, and the teetotum and marbles dash about the board knocking down some of the castles. A wire screen around the edge of the board prevents their leaving it. When the teetotum has stopped, the owner of each fallen castle pays to the Gunner his stake, multiplied by the figure which came uppermost on the teetotum, or twice as much if all the castles were knocked down.

The owner of each castle that remains standing receives twice his stake from the Gunner. Each player acts as Gunner in turn. If

and ribs of oak, and bulkheads near either end. It has a board floor, a seat for the paddler, and movable back and foot boards. The double bladed paddle is of pine or spruce, from six to twelve feet long, and jointed in the center for convenience of stowage and to aid in feathering.

To enter a canoe without upsetting requires caution. It is best to place one foot on the bottom, then one hand on either gunwale, then both feet on the bottom, and sit down as soon as possible, bearing most of the weight on the hands

Cannonade Board.

there are fewer players than castles, each in succession takes two or more. Instead of the method of scoring described above, any other may be agreed on by the players, before the game. A simple method is for the Gunner to score one for each fallen castle, and for each owner of a castle left standing to score two. The only skill shown is in making the tictotum spin as long as possible.

In another form of the game, pins, like Ten-pins, are placed on the board, among which the top spins, knocking down some of them.

CANOEING. Canoes are light boats sharp at both ends, and propelled by a paddle, the boatsman looking toward the bow. Pleasure canoes, in general, are of two kinds: paddling canoes and sailing canoes. Canoes may be built of bark, skins, canvas, paper, wood, or metal. The length of open canoes varies from 10 to 17 feet, the breadth from 2 to 3 feet, and the depth is 8 or 9 inches. The paddler kneels on a cushion on the bottom of the canoe. The decked canoe usually has a keel

until seated. The paddle is held in both hands, and the boatman dips the



Canoe: Side View, Top View, and Cross Section.

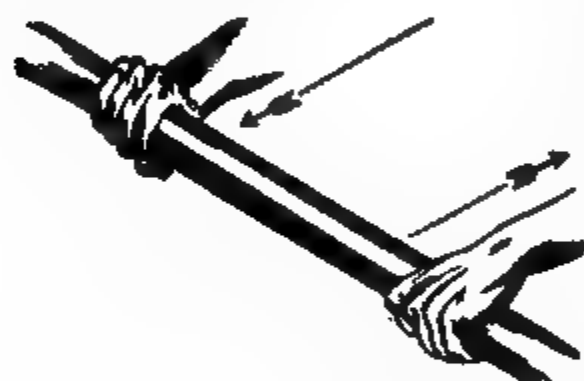
blade so as nearly to cover it, as far forward as he can reach on one side



Canoe Paddles.

of the boat, and then draws it steadily back, thus propelling the boat. With

a single paddle all the strokes are on the same side of the boat till the paddler changes for rest, and the boat is steered by giving the paddle a twist at the end of the stroke. With the double paddle the strokes are made on alternate sides, thus keeping the course straight. The unused blade will be in position to make the second stroke when the first is finished. The blades of a double paddle are usually set at right angles so that the one not in the water will always cut edge-wise through the air, and the wrist must therefore be turned slightly just before putting the blade



Method of Holding Double-bladed Paddle.

into the water. Short paddles must be held almost perpendicularly in the water. The paddle can be managed better by sitting high, but there is more danger of upsetting. In racing, the seat is generally placed nearly on a level with the deck. In order to be prepared for an upset, the canoeist should practice falling out and getting into his place again from the water. He must dress lightly, and should not attempt to paddle a canoe without knowing how

to swim. In canoe races, "upset races" are often included, where each contestant is required, at a given signal, in the course of the race, to overturn his canoe, scramble in from the water, and go on to the finish.

The sailing canoe has either a keel or a center board, which is now often made to fold up like a fan, when not in use. The sail may be either the lug, leg-of-mutton, or lateen (see SAILING). Two or three battens (thin strips of wood) are sometimes fastened across the lower part of the sail. A canoeist has estimated that the use of these battens enables a canoe to carry more sail, in the ratio of 7 to 5. Battens make the sail set flatter. The masts

Sailing Canoe.

are very light, and can be taken down in a moment. The yard and boom are generally of some light wood.

The rigging is as simple as possible, and so arranged that the canoeist need not leave his seat to work it. There is usually a rudder, managed with foot steering gear when the canoeist sits or lies in the bottom, as formerly in England; but in this country usually by a tiller fastened to a yoke near the hatch, where it is close at hand. The English have now generally adopted the American plan. The rudder should be hung so that it will extend below the keel and keep its hold on the water, even when the canoe lifts her stern clear at every wave.

In England canoeists generally lie down in the bottom of the canoe, while in this country they sit on deck except when sailing before the wind. Canoe sailing differs in some respects from ordinary boat sailing. (See SAILING.) If the canoeist cannot hold his boat upright by his own weight he should "luff" so as to ease her a little, and if that does not answer he should slack the main sheet. If it blows very hard he should take in sail altogether.

Many canoes have sliding seats, made in two pieces, the upper slipping sidewise over the lower to either side so that the crew can sit

away out to windward and balance the boat in a far heavier wind than would otherwise be possible. In tacking, the canoeist throws his weight forward and to leeward, shifting it as the canoe passes the wind's eye. Jibing is more dangerous in a canoe than in a sailboat, the canoeist being obliged to shift his weight suddenly to avoid over-

Camp-stove for Wood.

turning. More than one hundred pounds of ballast may be carried in a sailing canoe in bags of about 25 pounds each. As much as 175 pounds was formerly carried, but at present the most expert canoeists rarely carry ballast when racing.

Unless a canoe is very well ballasted, sail should never be kept on it when the sea is high enough to

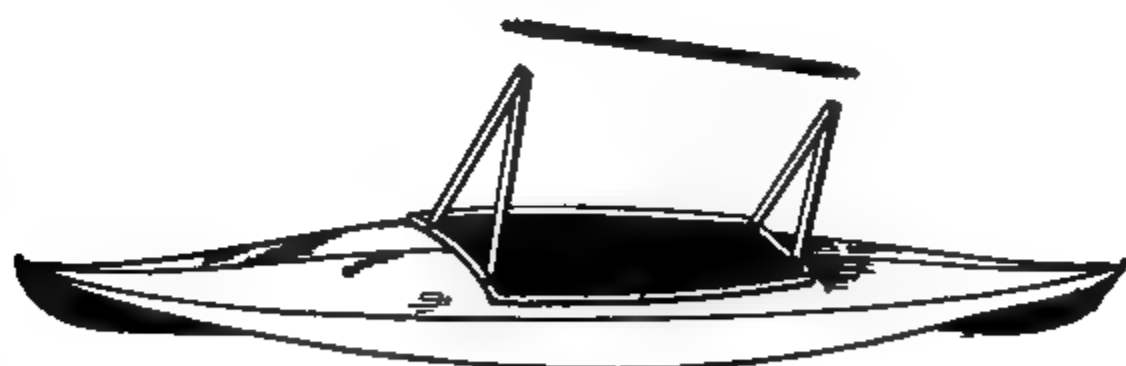


Fig. 1.—Frame of Canoe Tent.

break on board. The canoe should never be allowed to get broadside to the wind, except when it is absolutely necessary, as in turning. In heavy water, the course should be zig-zag, and heavy seas must be dodged. If it is necessary to take a

wave, it must be done with the end of the canoe toward it, and the canoe should be allowed to slide sidewise down the back of the wave. In running before the wind, the canoeist removes the back board, and, when it is necessary, stops the canoe's

headway by back strokes of the paddle. If the bows run under water, the halyards must be let go at once. The paddle should always be ready for use, and it is well to have a cork belt at hand. If the canoe should capsize, the canoeist must climb over it, let go the main halyard, haul on the down-haul, and get the main-

sail on deck, before trying to right the craft. In beaching a canoe, the sail must first be taken in, the rudder triced up and the hatch taken off. The canoeist then leaps out into shallow water with the painter, and hauls the boat on shore. Some special forms of tents for use by canoeists on their excursions are

Fig. 2.—Canoe Tent.

shown in the following illustrations, of which Fig 1 shows the frame of a canoe tent, Fig. 2 a canoe tent with its canvas cover, and Fig. 3 a tent for use on shore.

History. Canoes were used by the natives of all parts of North America before its discovery by Europeans. The Indians made their

canoes either of birch bark or of hollow logs, and paddled them with great speed. In British America on the Pacific coast the natives use canoes of cedar logs with extended prows, and with curious figures painted on the sides. Some of them are very large; one in the National Museum at Washington being 59

Fig. 3.—Shore Canoe Tent.

feet long, 8 feet wide, and 4 feet 8 inches deep. In Canada canoe clubs for recreation have existed since the days of New France. About 1854 the improved civilized canoe was introduced into England by John Macgregor, Esq., of London. Then it was imported to this country by W. L. Alden, who founded the New

York Canoe Club in 1871, and since that time the popularity of the sport has increased rapidly all over the Northern United States and Canada.

CAPACITY FOR HEAT, Experiments on. 1. In a bullet-mold make bullets of lead, zinc, tin, sulphur, and antimony. Prepare a cake of wax or paraffine, about half an inch thick,

by melting it and pouring it into a pan, and then lay the cake across the top of a tumbler. Put the bullets into boiling water for a few minutes and then place them all at once on the cake of wax. They will melt it and some will fall through, but some much more quickly than others. Still others will get only half-way or quarter-way through the wax. This is because they contained different quantities of heat, although they were all at the temperature of boiling water.

2. Weigh out the same amount of lead, sulphur, and copper scraps, and put them all into boiling water, or into hot oil, so that they will have the same temperature. Fill three glasses with water at the same temperature, and put the lead into one, the sulphur into another, and the copper into the third. Stir the water in each continually, and test from time to time with a chemical thermometer. The water containing the sulphur will be hottest, and that with the copper next, while that into which the zinc was put will be the least hot. The reason is the same as that given for experiment 1.

CAPPING VERSES, a game where one player quotes a line of poetry, and the next a line in the same metre rhyming with it, which will make sense. In this way an entire poem is made of separate quotations by the company. This game can be played in this form only by those who are very familiar with poetry, but almost any one with pencil and paper may cap verses, if allowed to consult all the volumes he desires. The paper may be passed from one player to another, each adding a line, or each may make an entire poem.

CARBON, Experiments with. (Read **CHEMICAL EXPERIMENTS**.) Carbon is described in C. C. T. To obtain it, the gases must be driven off by heat from some substance containing carbon, hydrogen, and oxygen. Such things are called hydrocarbons, and include most vegetable substances.

1. Arrange the apparatus as if to make oxygen, and half fill the ignition tube with powdered bituminous coal. On heating it a gas will be collected over water which is ordinary illuminating gas, but impure. It may be lighted in the jar in which it is collected, but the jar must not stand an instant mouth upward, or the gas will escape, being lighter than air. What remains after all the gas is driven off is a form of carbon called coke.

2. If the tube is filled with shavings of wood instead of coal, what remains after the gas is driven off is the form of carbon called charcoal.

3. Put spirits of turpentine into an alcohol lamp, light the wick, and cover it with a wide-mouthed jar, just raising one edge of the jar above the table by placing a bit of wood under it. The lamp will give off black smoke in volumes, which will collect on the inside of the jar. This is the form of carbon called lampblack.

4. Hold a piece of charcoal under water. It will rise to the surface if allowed to do so, and if held down will give bubbles of air. Heat another piece red-hot for some time and then put it quickly under water. Few bubbles will rise and the charcoal will remain under of itself. The reason is that charcoal is very porous and contains much air, unless this is driven off by heat.

5. Fill an inverted glass test tube with **AMMONIA** and hold it over a saucer of mercury, the mouth of the tube in the mercury. Heat a piece of charcoal red-hot, and hold it under the mercury till it is cool. Then put it up into the tube. It will absorb the ammonia, and the pressure of the air outside will then force the mercury up into the tube to take its place.



6. Put some powdered charcoal into a bottle filled with **SULPHUR-**

ETTED HYDROGEN and shake it about. The bad odor of the gas will disappear.

7. Put two pieces of raw meat about an inch square side by side on the ground, covering one with powdered charcoal. Place a heavy box over the two, so that no animal can get at them. If the weather be not cold, the uncovered piece will spoil in a few days, while the one covered with charcoal will give off no bad odor.

8. Arrange apparatus as if to make OXYGEN, but put into the ignition tube about a teaspoonful of red oxide of mercury and charcoal, mixed together. Heat, and collect over water, the gas which is formed. On the sides of the tube will be found little drops of mercury. The reason is that the charcoal has taken away oxygen from the oxide of mercury and left the mercury behind. The charcoal and oxygen form carbonic acid gas, which is the gas that was collected over water.

CARBONIC ACID, Experiments with. (Read **CHEMICAL EXPERIMENTS**). Carbonic acid gas is described in C.C.T. It can be made by burning charcoal or wood, but is then mixed with nitrogen from the air. (See C. C. T.) It may be made pure as shown in Experiment 8, under CARBON, but a better way is to arrange apparatus as for making HYDROGEN, putting in, instead of zinc, a handful of small lumps of marble, as big as peas. Either sulphuric or hydrochloric acid may be used, but the latter is better. Instead of marble, old mortar, pieces of oyster shells, or limestone will answer, though not so well. The carbonic acid comes from the marble, which is carbonate of lime.

1. Place the delivery tube in a glass of lime water so that the gas will bubble up through it. The lime water will soon become milky. This is caused by the formation of carbonate of lime in minute particles. If the current be continued long

enough the water will become clear, but if it is boiled it will grow milky again.

2. Blow into a glass of lime water through a glass tube or the stem of a clay pipe. The lime water will become milky from the cause explained above, because we breathe out carbonic acid gas from the lungs. A stream of air blown into lime water from a bellows will not make it milky, unless the room is very close and a good many people have been breathing in it.

3. Carbonic acid is so much heavier than air that it will remain in an uncovered jar. Into a jar of it dip a lighted match, bit of burning paper, or lighted candle. Each will be put out, as if by water.

4. Place a lighted candle in an empty glass and put it out by pouring a glass of carbonic acid over it.

5. Pour carbonic acid into a wide mouthed jar or deep preserve dish, nearly filling it. Blow a soap bubble, throw it into the jar or dish and it will float on the gas.

6. Fasten to a wire a piece of MAGNESIUM ribbon about six inches long, light it, and put it into a jar of carbonic acid. It will not be put out but will burn, leaving a quantity of white and black flakes in the jar. The white are magnesium oxide. The black are carbon from the carbonic acid.

7. Arrange a wire stand for several candles, one above the other. Light them and cover them with a tall jar. The candles will burn dim and then go out, the top one first, and then the others, one by one. Carbonic acid is formed by their burning, but it is so hot that instead of being heavier than air as when cold, it is lighter, and rising to the top puts out the upper candles first.

8. Collect the breath over water by blowing through a tube, into a jar, arranged as described under **CHEMICAL EXPERIMENTS**. Place a piece of glass over the mouth of the jar and then, turning it right side

up, set it on a table. A taper may now be extinguished by lowering it into the jar, or any of the experiments performed with gas made from marble and sulphuric acid may be repeated.

9. Pour into a flask or large bottle a strong solution of caustic soda, filling about one quarter of it. On this carefully pour pure water, letting it run down the inside of the flask, so that it will float in a thin layer on the soda. Instead of water one may use kerosene oil, which does not require care in pouring, as it cannot help floating. Make carbonic acid gas, as described above, and fill the rest of the bottle with it. Have ready a cork, pierced by a tube having an empty toy balloon attached to the lower end. When the bottle is full of the carbonic acid, insert the cork so that the balloon is within the flask. Then shake the flask, so as to disturb the layer of water or oil and bring the gas into contact with the soda. The balloon will at once become distended and may even burst, if the bottle is large enough. The reason is that caustic soda absorbs carbonic acid very readily, and the outside air rushes into the balloon to fill the place of the absorbed gas.

10. Make a solution of carbonic acid gas, by passing it into water, and put some freshly gathered leaves into a flask of it. Stand the flask upside down, in a shallow dish of water, and set it in bright sunlight. Little bubbles will be seen to form on the leaves and rise from them gradually until they collect in the upper part of the flask. After a day or so, place a piece of glass under the mouth of the flask and turn it right side up. The gas collected is oxygen, as will be seen by lighting a splinter, blowing it out so as to leave a glowing coal, and then dipping it into the mouth of the flask. The oxygen came from the leaves, which take in carbonic acid and breathe out oxygen, just as we take in oxygen and

breathe out carbonic acid. (See PLANTS in C. C. T.)

11. On some bits of marble in the bottom of a glass jar, pour sulphuric or hydrochloric acid. Carbonic acid will be made which will rise and fill the jar, driving out the air and overflowing gently like water. The room should be very still. Lower a candle which has been lighted for some time into the jar. If this is done carefully the vapor from the wick will continue to burn for a few seconds above the surface of the heavy gas, though the flame on the wick itself is put out. By quickly raising the candle it can be lighted again.

CARDINAL'S HAT, THE. A game played by any number of persons, who take the names of Red-cap, Blue-cap, Yellow-cap, etc. A player who takes the part of the Cardinal accuses one of them of stealing his cap, when the following dialogue ensues:

Player. "Not I, sir."

Cardinal. "Yes, you, sir."

Player. "Not I, sir."

Cardinal. "Who then, sir?"

Player. "Yellow-cap, sir,"

giving the assumed name of any player he chooses, who is then in turn accused by the Cardinal. If any one name a color not chosen by any player he must pay a forfeit. Sometimes a piece of wood, representing the hat, is actually hidden, and the Cardinal tries to find where it is by rapping the fingers of each player with his cane.

A similar game to this, called "The Abbot of St. Gall has lost his nightcap," is played by children in Switzerland, and an old English game called "The Parson has lost his fuddling cap" was also probably like it.

CARDS AND CARD-GAMES. Cards used in playing card-games are printed on sheets of cardboard, which are afterward cut apart. Their manufacture is described in the Cyclopædia of Common Things. They

are usually made rectangular, though sometimes with rounded corners, and are generally $3\frac{1}{4}$ inches long, by $2\frac{1}{4}$ inches wide. They are put up in collections of fifty-two cards each, which, taken together, are commonly called a pack (Italian *pacco*, a packet) of cards. In some parts of the southern United States, however, a pack is still called a deck of cards, the term used in England two or three centuries ago, which had its origin probably from the fact that the cards are piled regularly one over another (the word deck being from the Anglo-Saxon *decan*, to cover). Shakespeare uses the word

in King Henry VI. (Part iii., Act v., sc. 1), where he says,

"The king was slyly finger'd from the deck."

While a full pack of cards always consists, in America and in England, of fifty-two cards, smaller packs, for playing special games, are sometimes put up. Thus, a Euchre, Ecarté, Piquet, Bezique or Pinochle pack contains only thirty-two cards, the twos, threes, fours, fives, and sixes of each suit being left out. In the United States an extra card, sometimes blank and sometimes printed with a suitable device, called the Joker or Imperial

1. The Sun.

2. Time.

3. Tower Struck
by Lightning.


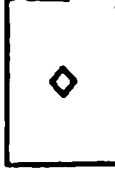
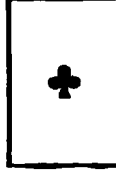















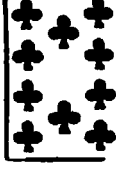



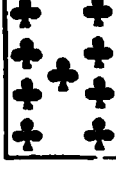


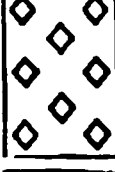
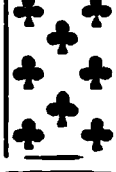
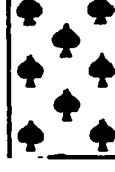


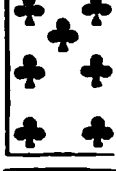
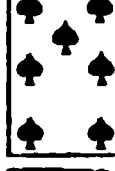
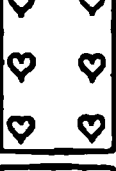

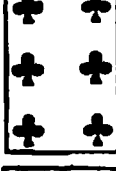
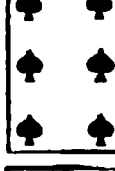
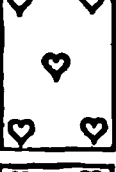
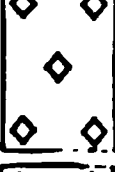
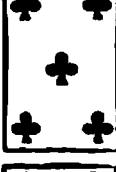
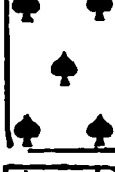
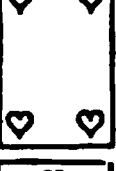
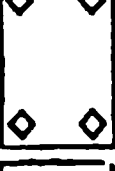
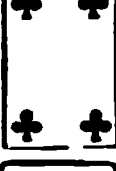
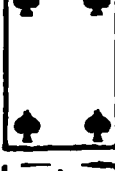
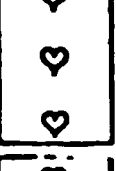
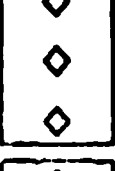
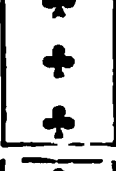
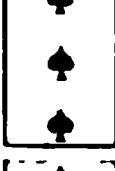

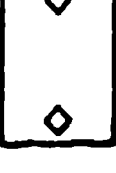
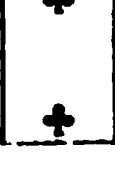
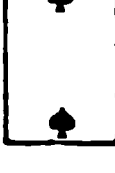
4. Last Judgment.

Cards of Charles VI.

Trump, is generally put into each Euchre pack, making thirty-three. It is frequently added also to each full pack, making fifty-three in all; but as this card is used only occasionally, it is not considered as belonging to a pack, and in this book a pack of cards is always understood to mean fifty-two cards.

The cards in every pack are divided into four groups of thirteen, called suits (because in each they follow in regular order), each of which is distinguished by a special mark or symbol. Two of these suit-marks, or symbols, called Hearts and Diamonds, are red; and two, Clubs and

Spades, are black. The origin of their names will be explained under the history of cards. In each suit, three cards—the King, the Queen, and the Knave, or Jack—are picture cards, called face, figure, or court cards, and sometimes also honors. The other ten are numeral cards, called pip, point, or spot cards, because they are marked by pips, or spots, numbering from one up to ten. The card with one spot or pip is called the Ace, and the Two-spot and the Three-spot are sometimes called respectively the Deuce and the Tray; but ordinarily the cards are named as in the following table:

	RED SUITS.		BLACK SUITS.	
	Hearts.	Diamonds.	Clubs.	Spades.
Ace - - -				
King - - -				
Queen - - -				
Knave - - -				
Ten - - -				
Nine - - -				
Eight - - -				
Seven - - -				
Six - - - -				
Five - - - -				
Four - - - -				
Three - - -				
Two - - - -				

The Ace of Spades has generally on it the name and address of the manufacturer, and in England, where the government taxes cards, a stamp, showing that the tax has been paid, is also put upon it. In some countries the Ace of Diamonds is the stamp card. If the value of the cards followed their natural order, the King would be the highest card, and the Ace the lowest; but in Whist the Ace is lowest only in cutting, and outranks the King in playing, and in other games it has different values. In Cribbage only, is the Ace the lowest card in playing. In some games the Tray is the best card, and in others, the Five-spot, the Ten-spot, etc. These variations in the value of cards have much to do with the differences in games.

CUSTOMS AND TERMS.

In almost all card games, certain customs and terms are common. These are described here to avoid repetition, and are not explained in the article on any particular game, unless they differ, in that game, from the ordinary rule.

Shuffling, the mixing of the cards before playing a game. This is usually done by the dealer, who holds part of the pack loosely in one hand, and slides in the rest of the cards with the other, so as to mix them thoroughly. Expert players have other ways of shuffling, which may be learned by practice. Each player has a right to shuffle, if he chooses, before the dealer, but it is generally done by the dealer only. The cards should be shuffled before each deal.

Cutting, the dividing of the pack by one of the opposite players, so as to insure a fair deal. After shuffling, the dealer lays the pack near his right-hand neighbor, who lifts off part of the cards, and places them on the table beside the rest of the pack. The dealer then puts the remainder upon the part lifted off, and takes up again all the cards,

which are then ready for dealing. In cutting, at least as many cards as there are players must be lifted, and at least that number must be left in the pack. The dealer has no right to shuffle again after the cards have been cut. As cutting was originally an attempt to prevent cheating, it may be omitted in many games, though any of the players has a right to demand it. Sometimes the person to whom the pack is offered for cutting, taps it with his finger, meaning that he is willing to omit the cut.

Dealing. The distribution of the cards to the players is called dealing; and he who distributes them is called the dealer. The dealer must be

selected before either shuffling or cutting. This is usually done by cutting for deal; that is, each player lifts part of the pack, showing the bottom card of what he has lifted, and he whose card wins has the right to deal. In some games the lowest and in others the highest card cut determines the deal, and in some the value of the cards in cutting differs from that in playing. Instead of cutting for deal a card may be given to each player, face upward; he that has the winning card becoming the dealer. In some games the cards are dealt one by one till some particular one appears, and the player to whom that card falls is dealer. Any one of these methods

5. Emperor.

6. Empress.

7. Pope.

8. Hermit.

Nabib.

may be adopted in any game, by agreement.

When the cards have been shuffled and cut, the dealer takes the pack in his left hand, and with his right gives one or more at a time (according to the game) to each player in regular order, beginning with the one at his left. In some games all the cards are dealt, in others part of the pack is left. The deal is an advantage in games where the trump card is part of the dealer's hand, as will be explained below, and in some other games for special reasons. The cards are usually dealt several times in the course of a game, and each player deals in turn, the deal

passing around the table to the left.

Misdeal, a mistake made in dealing. In most games the cards are divided equally, so that the dealer gives the last one to himself. If the last card falls to any one else, he has made a misdeal. When any player discovers that he has not the proper number of cards, or when any of his cards are dealt to him face upward, he may demand a fresh deal. In games where the deal is an advantage the dealer is usually punished for his mistake by giving it to his left-hand neighbor, but in other games the same player usually deals after a misdeal.

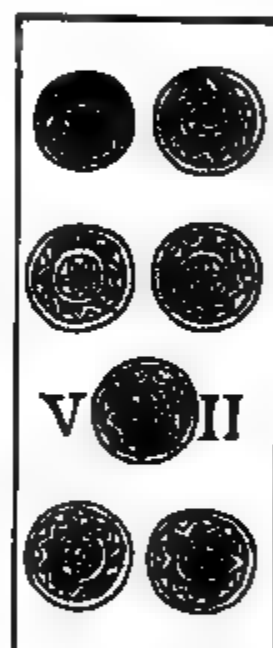
Hand. The cards that are dealt to each player are called his hand, and those that are left, if any, are named the stock, or talon. Where the hands are large it is better for each player to arrange his cards by suits, but this should be done so as to avoid giving his opponents any information. When each has played all his cards, a hand is said to have been played, and there is a new deal.

Trump. In most card games, after the deal, the dealer turns face upward a card, which is called the trump-card, or trump. Sometimes this is the last card dealt, in which

case it forms part of the dealer's hand, and may be taken up with his other cards, after one round has been played. Sometimes it is the top card of the stock, or is taken from the middle of the stock, and in some games one of the players, usually the dealer, is allowed to exchange one of his cards for the trump card. Cards of the same suit as the trump are called trumps, and usually rank above those of other suits. Thus, the lowest trump is a higher card than an Ace or King of any other suit. When the Joker is used, it is always a trump, and is the highest card in



9. Seven of Cups.



11. Seven of Money.

10. Seven of Swords.

12. Seven of Clubs.

Italian Cards.

the pack. In some games, one or more cards of other suits are regarded as belonging to the trump suit, as is explained in the articles on those games. All but the trump suit are called lay suits, and a card of any such suit a lay card.

Playing. After the trump has been turned and each player has arranged his cards, the one on the dealer's left, who is called the eldest hand, plays one of his cards face upward, and each player follows in order, to the left, until all have played. The cards so played are

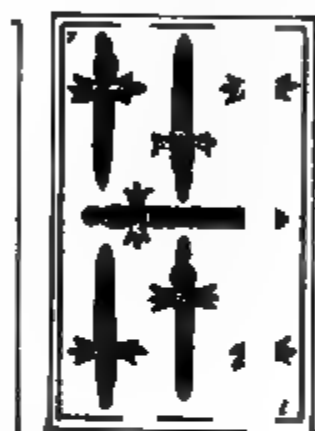
called a trick, and the one who plays the first card in the trick is said to have the lead, and is called the leader. In most games each must play, if he can, a card of the same suit as the leader; this is called following suit. If he cannot follow suit he may play what he pleases, which is often called renouncing, and if he then chooses to play a trump, it is called trumping or ruffing. If he renounce when he is able to follow suit, it is called revoking. The player making a revoke may be punished for his offense in various ways.

In some games a player is allowed to trump even if he can follow suit. The trick is the property of the one playing the highest card of the suit led, unless one or more players trump, in which case the highest trump played takes the trick. The player taking the trick then has the lead for the next one. Each keeps his tricks in a pile near him, face downward.

Discarding. In some games a player is required or allowed to remove one or more cards from his hand. This is called discarding. The discarded cards are usually

placed either in or under the stock, or by themselves, face downward.

Score. Each player must keep count of the number of points he has made, which is called keeping score. The points are determined differently in different games. Sometimes they are so few and so easily remembered that each can keep score mentally, but pencil and paper are usually required. In some games score is kept with two cards, by placing one partly over the other, so as to show a number of pips corresponding to the points won. Score cards of several different kinds can



13. Seven of Cups.

14. Seven of Swords.

15. Seven of Money.

16. Seven of Clubs.

Spanish Cards.

be bought, some of which are for use in one particular game, and others in various games. In some games score is kept by means of counters or "chips," which are usually round flat pieces of ivory, bone, or celluloid.

Four counters, or chips, are sometimes used for scoring up to ten points, being arranged as shown below. It will be noted that a single counter placed at the top always counts three, but at the bottom five.

1	o	7	oo
2	oo	8	ooo
3	ooo	9	ooo
4	oooo	10	ooo
5	ooo		o
6	ooo		o

For the numbers from ten to

twenty an oblong counter is sometimes laid above the others, thus:

11	— o
12	— oo
13	— ooo

and so on.

Partners. In many card games each player wins or loses by himself, but in many others, where there are four players, two play against two, and in a few this is the only way of playing. Those who play together are called partners, and sit opposite each other. Only one score is kept for the two, and their tricks are placed in the same pile, for they win or lose together.

Partners are sometimes decided on by cutting, the two who cut

the highest cards playing together against the other two.

HISTORY OF CARDS.

Playing cards were probably first made in Italy in the 14th century. The Chinese say that they were invented in the reign of their emperor, Sè-un-ho, in 1120, and some European writers have tried to prove that they were first brought into Europe from India by the Gipsies, while others have asserted that they were introduced into Spain by the Moors, but there is no positive evidence to support any of these theories. The common story that they were invented in 1392 for the

amusement of the French king, Charles VI., grew out of a record, found among the royal accounts, of a payment made to a painter for "three packs of cards in gold and various colors, and ornamented with several devices, to carry before the lord our king for his amusement." But this shows that cards were then well known, rather than that they were then first made, and that these were special ones painted finer than usual for the personal use of the king. Some cards, said to be part of one of these packs, are preserved in the Paris Library (see 1, 2, 3, 4), but the best authorities consider them Venetian cards of the 15th century.



17. Seven of Hearts. 18. Seven of Leaves. 19. Seven of Bells. 20. Seven of Acorns.

German Cards.

It is now generally conceded by the latest writers on the subject, that cards originated in Italy (probably in Venice) about 1350. The first packs were probably wholly of figure or picture cards, containing no numeral or pip-cards, and were purely emblematic—that is, representing some person or symbol. These cards, called *Nalbis* (a term supposed by some to be derived from the Arabs, and still preserved in the Spanish name for cards, *naypes*), had nothing to do with games of chance, but were intended for instructive amusement, like the game of Authors and many similar games played by young folks to-day. Some of the writers of

that century prohibit the playing by children of Dice and other games of hazard, but recommend *Nalbis*. These *Nalbis*, or emblematic cards, differed somewhat, according to time and country, but generally were partly of full-length figures, illustrative of some condition of life, such as an Emperor, an Empress, a Pope, a Hermit (5, 6, 7, 8,) and partly of symbolic designs, such as the World, the Sun, the Moon, a Tower struck by Lightning, the Last Judgment, etc., as in those of Charles VI. Each one had at the top a number in Roman numerals, and at the bottom, below the design, its name, generally in French. Exactly how many *Nal-*

bis were in a pack originally is not known, but the number probably differed at different times.

Toward the end of the 14th century it is supposed that these instructive cards were adapted, by certain changes, to the use of older persons, in the hope of restraining them from playing Dice and other games of hazard. Part of the original *Nalbis* being selected, certain other cards, intended to teach a moral lesson, such as Death, Temperance, the Devil, and the Last Judgment, were added, making the whole number of such cards 22. To these were added 56 other cards, divided into four suits of fourteen cards each, each suit made up of four picture or coat-cards (corrupted into court-cards), representing a King, a Queen, a Cavalier, and a Valet, or man-servant, and of ten numeral, or pip-cards, numbered from one to ten. These additions made the full pack consist of 78 cards, divided into five suits, the 22 *Nalbis* forming a suit by themselves, superior to the other four suits. For this reason they were sometimes called also *atutti* (French *atouts*, above all), and *trionfi* (French *trionphes*, triumphs), from which comes our word trumps. The pack of cards thus made was called by the Italians *Tarocchi*, because used to play the game of that name, and by the French *Tarots*.

The use of cards spread rapidly throughout Europe, but different people soon began to alter the mode of combining them and their symbols, according to their own notions. In Florence, the number of emblematic cards was increased to 41, making 97 in all. In Bologna, the pack was reduced to 62, and finally the first of the five suits, the emblematic cards, was thrown out altogether and one coat-card, or honor, was dropped from each of the remaining suits, making the pack 52, the number now generally in use. The coat-card generally omitted was the Cavalier, but the Spaniards, who would not

allow the figure of a lady on their cards, dropped the Queen, and the Germans sometimes kept an upper and a lower Knave in place of the Queen and Knave. The Spaniards also threw out the four Ten-spots, making the pack to consist of but 48 cards. In the early cards, the figures on the honors bore some resemblance to the persons they were intended to represent, but about the reign of Henry VII. of England, they began to take the grotesque forms which have since been most popular. Most English and American cards still show the costumes of Henry VII. and Henry VIII., though the full length figures have mostly given place to busts, printed double, and in reverse, on each honor, that the card may be the more easily known, whichever way it may be thrown on the table. Attempts to produce a better type of figures on cards have generally met with failure, as most card players prefer the ancient style. Toward the latter part of the 15th century, the French began to name the Kings, Queens, and Knaves on their cards, giving them historic or legendary titles, such as La Pucelle, (The Maid, that is—Joan of Arc), the Dukes of Burgundy and Normandy, etc., and Helen, Venus, La Sybille, etc. About the time of Henri IV., the Kings were generally called David, Alexander, Cæsar, and Charlemagne; the Queens, Rachel, Argine, Pallas, and Judith; and the Knaves, Hector, Lancelot, Roland, and Hogier; and these names were afterward generally employed until the custom ceased. At the time of the French Revolution, when royalty was discarded, the signs of royalty were removed from the French cards; the Kings were replaced by sages and philosophers, the Queens by emblematic figures of virtues and liberties, and the Knaves by warriors or Roman heroes. Napoleon had these changed for artistic designs by the painter David, but after the Emperor's downfall the people pre-

ferred to go back to the old style. Other attempts, in later times, to make cards vehicles of information, to teach arithmetic, grammar, geography, history, mythology, etc., have also failed.

The signs or marks of the four suits of cards have varied in different countries. The earliest used in Italy were *coppe* (cups, 9), *spade*

(swords, 10), *denari* (money, 11), and *bastoni* (clubs, 12). These were called by the Spaniards *copas* (cups, 13), *espadas* (swords, 14), *oros* or *dineros* (money, 15), and *bastos* (clubs, 16). The Germans early employed other marks; *herzen* or *roth* (hearts, 17), *laub* or *grün* (leaves, 18), *schellen* (bells, 19), and *eicheln* (acorns, 20). The French,

21. Three of Geese.

22. Six of Birds.

23. Camel.

Hindoo Cards.

24. Horse.

during the second quarter of the 15th century, adopted the signs of *cœurs* (hearts), *carreaux* (diamonds), *trèfles* (trefoils), and *piques* (pikes). The *trèfles* were taken probably from the German *eicheln* or acorns, which they somewhat resemble; and *piques* from the German *grün*, or leaves, though they

got their names from a fancied resemblance to a pike head. These marks have since been generally adopted by all other nations, excepting the Spaniards, who still use the old Italian marks. Other symbols have, however, been in vogue at different times, the Germans, about the beginning of the 15th century,

using animals, flowers, fruit, etc. One old German set has for suit marks dogs, falcons, stags, and ducks; another, rabbits, parroquets, pinks, and columbines; and a third, lions, monkeys, parrots, and peacocks. In 1862, during the Civil War in the United States, cards were printed in New York with eagles, shields, flags, and stars for suit marks, and a colonel, the Goddess of Liberty, and a major, for King, Queen, and Knave. The English seem to have adopted all the French suit marks together with the French names for the two red suits, but to have taken the Italian or Spanish names for the two black suits, calling *trèfles* clubs, a translation of the Italian *bastoni* or the Spanish *bastos*; and *piques* spades, which is derived from *spade* or *espadas*, the Italian and Spanish words for swords.

Cards were at first made much larger than now, some of the early German ones being seven by four inches. They were, too, sometimes made square, and sometimes circular. Hindoo and Persian cards are often circular, about 2½ inches in diameter, though those used in Teheran are generally of the European size and shape. Hindoo cards are sometimes of eight suits of twelve each and sometimes of ten suits of twelve each. The suit marks are birds, swords, suns, moons, etc. (21, 22, 23, 34). Persian cards have generally 96 in the pack, with suns, moons, harps, sabres, etc., for suit marks. Chinese cards are long and narrow, from 2½ to 2 inches long by 1 to 1½ wide (25, 26). They are printed with black ink on thin white cardboard, and the backs are black, red, or plain white. Japanese cards are much like the Chinese, differing only in their marks.

The earliest card game played is supposed to have been *Tarocchi*, invented at Venice, played with 78 cards, called from it Tarocchi cards, or, in French, *Tarots*. This was

followed by the Florentine game of *Minchiata*, played with 97 cards; by the Bolognese game of *Tarocchino*, with 62 cards, and by the Venetian game of *Trappola*, with 40 cards. *Frusso* (Flush), *Bassetta*, and *Primiera*, were also other early Italian games. *Primiera*, called in Spain and England *Primerio*, and in France *Prime* and *Ambigu*, was the ancestor of our Brag and Poker. In Germany, one of the earliest games played was *Landsknechtspiel* (Foot-soldiers' game), called in French *Lansquenet*. The oldest Spanish game is probably *Ombre* (*Hombre*, man), called *Omber* in England, where, as well as in France, it was

25. Court Card.

26. Pip Card.

Chinese Cards.

once much played. There were many modifications of it, among them *Quadrille* and *Solitaire*. England has no national game of cards, unless Whist may be so considered, the games played there being derived from Italy, Spain, or France. *Primerio*, one of the earliest, was fashionable from the reign of Henry VIII. to that of James I. It was succeeded by a game called *Mauve*; then came *Gleek*, *Omber*, *Quadrille*, *Reversis*, and *Bassett*; and finally *Ruff*, and *Honors*, which, about 1650, led to Whist. The card games

usually played now are described in special articles in this book.

CASINO, or **Cassino**, a game of CARDS played best by four persons, but sometimes by two, three, five, six, or even more. The players may be divided into two sides, or play each for himself. The dealer deals from a full pack four cards, one at a time, to each player and lays four more face upward on the table, either as he deals or all at once. When the players' cards are gone, four more are dealt to each one until the pack is used up, but none are put on the table except at the first deal. The leader (or elder hand) can take not only all cards of the same value, among those on the table, but also any cards the number of whose spots, added together, equals his. Thus a Nine will take not only all other Nines on the table, but at the same time a Five and a Four; a Six and a Three; a Seven and a Two; an Eight and an Ace; a Four, a Three, and a Two; or any other cards which will make nine when their spots are added. Face cards can take only corresponding face cards. If the leader has no card that will take anything, he must lay some card on the table, but if he has left in his hand a card that will take the card laid down, in connection with others on the table, he can make a pile of the cards he is able to take, at the same time announcing to the other players with what card he means to take them at a subsequent time, though not necessarily his next turn. If the cards so piled form a single group it is called "building," if several groups, it is "calling," or duplicating. Thus if a player combine a Six from his hand with a Two and an Ace on the table, and say "Nine," it is only a "build," but if he include in the pile a Nine-spot on the table or another group the sum of whose spots is nine, he must say "Nines" (using the plural) and it is a "call." The cards of neither a build nor a call can be taken separ-

ately by pairing, but an adversary may raise a build in amount by the addition of another card, while a call cannot be raised. A call must be taken by the card it represents, either alone or with other similar piles. The second player may likewise take what he can with his card, or build, or call, remembering in either case that a build can always be treated like a single card, while a call cannot.

If he can do none of these things he must lay down a card with the others. The players in turn have the same choice till the pack is exhausted. When the pack has been played, he who takes the last trick takes also the rest of the cards on the table. Each player then counts his points according to the table given below :

Big Casino (the Ten of Diamonds)	
counts	2
Little Casino (the Two of Spades)	1
Each Ace	1
The greatest number of Cards .	3
The greatest number of Spades .	1

Besides this, when a player has taken all the cards on the board at once (except at the end of the game) it is called a sweep, and counts 1. A sweep is generally marked by facing or turning over one of the cards in the pile of tricks belonging to the player who makes it, so that, when the points are counted at the end of the hand, there is no trouble in remembering it.

The person or side first making ten points usually wins the game; but when only two persons or sides are playing, the count is sometimes made by giving to him who makes the greatest number of points in a hand only the difference between his points and those of his opponent, while the latter scores nothing; thus, if A has 8 and B has 5, A scores 3 and B nothing; while if they are equal, neither scores. If three play in this way, the two lowest add their points and subtract their sum from the highest, and no one scores when

this sum equals or exceeds the highest. The game is made longer by counting thus, but it can hardly be done when more than three are playing separately, as usually no one could score.

In playing Casino, when no card on the table can be taken it is best to lay down face cards. These are of the least use in one's own hand and the hardest to take on the table, since no combinations can be made with them. Care should be taken in laying down an ace, for in taking it with another ace your opponent wins two points for the final count at once, and it is also the easiest card to combine. It would be better even to lay down Big Casino, for that can be taken only by a ten. After the learner has played the game once or twice other suggestions will soon offer themselves.

RULES OF THE GAME.

1. The tricks must not be examined nor counted before all the cards are played.

2. If the dealer show a card before any of the four in the middle are dealt, or if he dealt too many or too few cards to any one, he must deal again.

History. The word casino is Italian and means little house. Club houses where people meet for amusement are often called casinos, and this game may have been so named because it was a favorite at such places.

Kapak, or Russian Casino. In this form of the game the Knave counts 11, the Queen 12 and the King 13. There is no "building." Sweeps are called "Kapak," and Big Casino and Little Casino are called respectively the "Good Ten" and "Good Two." Clubs count instead of Spades, as in ordinary Casino, and the "Good Two" (Little Casino) is the Two of Clubs. In all other respects Kapak is played like ordinary Casino.

CAT, a game played by any number of persons with a piece of wood

called a Cat. The Cat is a piece of wood about six inches long and $1\frac{1}{2}$ or 2 inches thick, sharpened at both ends. If it is laid either on level ground or with one end projecting over a hole, and the end be struck down quickly with a bat, it will rise in the



The Cat.

air, twirling, and may then be struck away with the bat.

The game may be played in various ways. In the simplest, a large ring is made and one player, standing within it, strikes the cat as described above. If it fall within the ring, he is out and another player takes his place. If it fall outside he guesses how many lengths of the stick it is from the center of the ring. The distance is then measured, and if it is less than his guess, he is out; but if not, he scores that number of points and has another turn. After as many rounds as have been agreed upon, the player scoring the most points wins.

Another way of playing is to make as many holes in the ground as there are players on a side; the holes are made as nearly as possible in a circle and at equal distances. A player, with a bat, stands at each hole, and all the players on the other side stand outside the circle. One of the batsmen strikes the Cat, and then all run around the circle. Every time they reach new holes the side scores one run. The next player in order then strikes the Cat, and so on. But if a player on the other side can throw the Cat between any two holes before the player who has left one of them reaches the other, the runner is out, and when one or more players are out (whichever has been agreed) the sides change places. When each side has been at the bat the number of times previously agreed upon, the game is ended, and the side that has made most runs wins.

This game is very old. It was known to the Venetians in the 16th century. It is a common sport also

in Hindostan, where it is called *Gulli Danda*. It may have been taken to India by Venetian traders.

CAT'S CRADLE, a game played by two persons with a string, four or five feet long, whose ends are tied together. The string, which is held

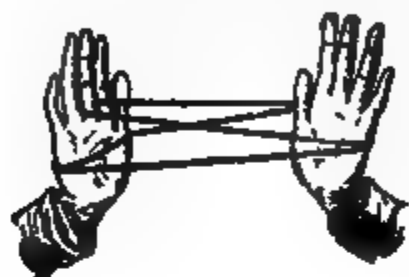


Fig. 1.

on the hands of one of the players, is removed by the other, and so on alternately; it assuming a different form each time. Some of the variations, of which there are many, are shown in

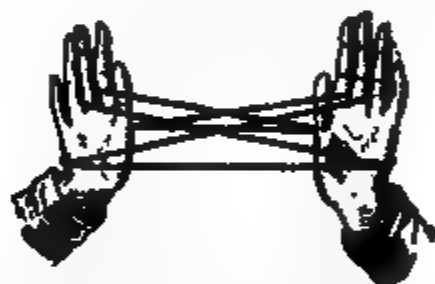


Fig. 2.

the illustrations. The player who begins holds his hands in front of him with the palms toward each other, and the string passing around the backs. He then takes a turn around the

Fig. 3.

string with each hand so that it also passes across each palm. He then passes the middle finger of his right

hand under the part that crosses the opposite palm, and pulls it back as represented in Fig. 1. After he has done the same thing with the left middle finger, the string appears as



Fig. 4.

in Fig. 2. The second player now seizes the upper strings, with the finger and thumb of each hand, as shown in Fig. 3, pulls them over the outside string, and pushing them up

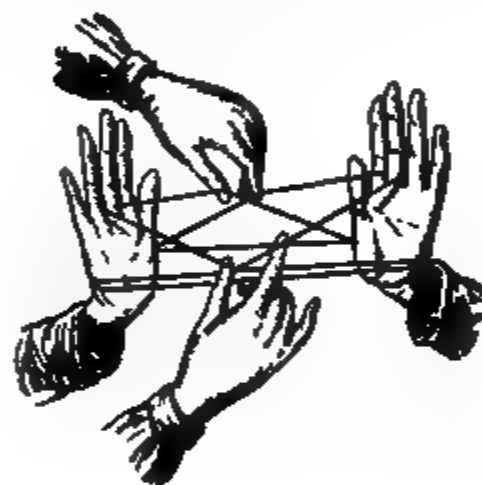


Fig. 5.

inside, takes the strings off in the shape shown in Fig. 4. Other variations are shown in the illustrations which follow. Each is made from some previous arrangement by one

Fig. 6.

player's taking the string from the hands of the other. The proper way of doing this may be studied out by the learner, who may also

invent many of new figures to suit himself. The different arrangements are often called by special names. In Germany some of them are "The Single Cross," "The Double Cross," "The Water" and "The Violin."

History. This game, which is

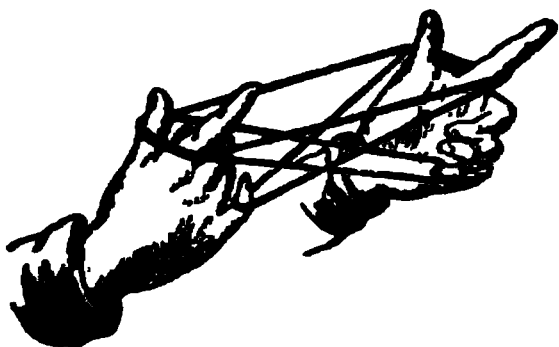


Fig. 7.

probably of great antiquity, is found in nearly all parts of the world. The Dyaks, or natives of Borneo, are very skillful at it, making many kinds of puzzling figures, and the Maoris of New Zealand are also fond of it. The latter call it *Mani*, the name of

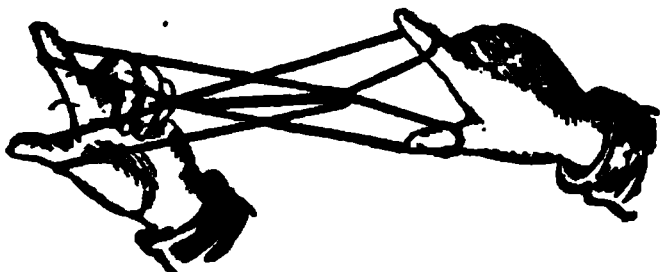


Fig. 8.

their national hero, by whom they say it was invented. Its various patterns represent incidents in Mani's life, and other events, forming a kind of pictorial history of the country.

CATCH THE TEN, or **Scotch Whist**, a game of CARDS played by two to eight persons with a pack from which the Twos, Threes, Fours, and Fives are omitted. If it is necessary, one or more of the Sixes may also be left out, that the cards may be equally divided. The cards rank as in Whist, except in the trump suit, where the Knave is higher than the Ace. When two persons play, three hands of six cards are dealt to each, which must be kept separate and played in the order in which they are dealt. When three play, two hands are dealt to each in like

manner. When more than this number play, each is dealt one hand, the cards being divided evenly. In all cases the last card is turned for trump. Six persons may play in two partnerships of three each or three of two each; and eight may form two sides of four each or four of two each. The players must sit so that no two on the same side are together. The cards are played as in WHIST. Each card above the party's share in the tricks taken scores one toward game. Thus, if three are playing each one's share of cards is 12, and if one of them takes 5 tricks (15 cards) he scores three points. In like manner, if four are playing, two against two, and one side take 6 tricks (24 cards) they score 6, the share of the party being 18. In addition, the five highest trumps count for those who take them as follows:

Knave,	11
Ace,	4
King,	3
Queen,	2
Ten,	10

It will thus be seen that the principal object of the game, aside from making tricks, is to take the one containing the Ten of Trumps, for the Knave, being the highest card, cannot be taken from its owner.

Hence the name "Catch the Ten." He who has the Ten should try to save it by playing it on a trick already taken by his partner, or by trumping with it. If a player have the two highest trumps, he should lead them, in hope of catching the Ten, or of enabling his partner to save it. In other respects the rules for playing are similar to those of Whist. If a player revoke, his side loses the game.

CAYENNE, a game of CARDS, played by four persons, two against two, with a full pack. The cards are dealt as in WHIST, and the dealer, after turning the last as trump, decides which of four games shall be played. These are called respectively, "In Suits," "Grandissimo," "Cayenne," and "Nullissimo." The

game In Suits is like WHIST except that the dealer turns down the trump card and makes a new trump, and every trick more than six counts 2 points. In the Cayenne game the turned trump is retained and the odd tricks count 4 each. In the Grandissimo game there is no trump, and the odd tricks count 6 each.

Nullissimo is like Grandissimo except that the object is not to take tricks, and the odd tricks count 4 apiece to the opposite side. The Ace, King, Queen, Knave, and Ten are called Honors. Three Honors count 2, Four Honors 4, and Two Honors 6. It will be seen that the more difficult the game the more valuable are the tricks. If the dealer has a long suit and knows he can get the lead, he will probably choose to play Grandissimo. If he has a very poor hand he will choose Nullissimo.

CENTAUR, THE, a diversion in which two boys or men personate a Centaur, a creature of Greek mythol-

and a tail, like a horse's, is made of strips of cloth or paper and pinned to the shawl in the rear. The Centaur should hold a bow and arrow in his hand, and have a cloak thrown loosely over his shoulder and over one arm, while the other is bare (See Fig. 2). Two Centaurs may engage

Fig. 2.—The Centaur.

in a combat, but this requires some practice. There should be signals arranged between the front and rear performer, so that the latter will know what to do, and the two should also practise the ordinary paces of the horse, such as walking, trotting, and galloping. Imitation hoofs of pasteboard may be made and fastened over the shoes.

CENTRIFUGAL FORCE, Experimentson. 1. Tie a stone or any other heavy object to the end of an elastic cord and swing it around in a circle by the other end of the cord. The cord will be stretched. The reason is that the stone strives to move in a straight line; the cord confines it to a circle, hence the stone stretches the cord in its effort to get away. This outward pull exerted by the stone is generally called centrifugal force (Latin *centrum*, centre, and *fugo*, to fly). Let go the cord and the stone will fly off as if it had been thrown in the direction in which it was moving when it was released.

Fig. 1.—The Centaur.

ogy, half man and half horse. One player stands erect, and the other, behind him, bends his body so that his back is horizontal, and holds the first player's hips with his hands, as in Fig. 1. A table-cover or shawl is thrown over the second player and pinned around the waist of the first,

2. Half fill a quart pail with water, tie a cord about two feet long to the handle, and swing the pail in a circle. The water will not fall out, even when the pail is upside down. The reason is that its centrifugal force makes it press against the bottom of the pail.

3. Take the same pail, and after twisting the string tightly, allow it to untwist, spinning the pail horizontally, or use a TWIRLER to make it spin. The water will heap itself up against the sides of the pail, leaving a hollow in the centre. The faster the pail spins, the higher the water will be at the edge, and as it stops spinning the water surface will grow level again.

4. Put into the pail equal quantities of water and some kind of oil that will float on it. Spin as before, and the water will seek the edge of the pail, leaving the oil within. It is on this principle that machines are made to separate the cream from milk in a few minutes.

5. Suspend a small fish-globe by tying a string around the top, which should have a groove. Spin it as before, and then pour into it about a tumblerful of water. The water will leave the bottom entirely, and form a ring around the middle of the globe.

6. Wet a TOP and then spin it. The water will be thrown off in spray from all sides.

CHARACTERS. The name of two different games. I. A game played by any number of persons, one of whom leaves the room while the others agree on some historical character he is to represent. He is then called back and each player asks him a question or makes a remark to him as if he were the character agreed upon. From these questions he must try to guess what character he is supposed to represent, and if he succeeds, the person whose question enabled him to do so must represent the next character. The questions are usually put so as to

puzzle the guesser as much as possible. For instance, if Washington be the character agreed upon, one player may ask, "Do rifle balls bound from you as if you were made of rubber?" (referring to his remarkable escape in the French and Indian war); another, "Do you think mid-winter the best time for crossing rivers?" (referring to the passage of the Delaware); and another, "Have you outgrown your early fondness for destroying fruit trees?" Instead of historical characters, persons well known to all the company are sometimes selected, which often makes the game more amusing.

II. A game in which each player is given one letter of the name of an historical character, the players seating themselves in the order in which the letters occur in the name. Each one then selects another character whose name begins with the particular letter assigned to him, and the player sent out, being re-called, tries to guess each of these by questioning the others one by one, in any order he pleases. He is not to be told whether or not he has guessed aright, but when he thinks he has found out several he may guess the name of the character agreed on by the company and must be told whether this guess is correct. If it is not, he must find out more initial letters and try again. The player whose letter enables him to guess correctly must take his place as guesser for the next game. If the name selected has more letters than the number of players, several of them may take two or more, and if there are more players than letters, part or all of the name may be repeated; but the guesser must be told, in the first case, which players have more than one letter, and the order of those letters, and, in the second case, which player has the last letter of the name.

Century Court, a kind of Characters, in which the person who leaves the room is given the name of a whole century instead of a single

character. On his re-
charged with all the c
century and praised for
men or events. As in t
described, this goes on t
guesses the century he
to represent.

ACTING CHARADE, a play, the
scenes of which represent respect-
ively the syllables of some word and
the whole of that word. Thus, the
word may be carpet, when there
would be three scenes, representing
the words Car, Pet, and Carpet. The
different scenes may be parts of the
same play, or each may be complete
in itself. Acting charades may be
learned from printed books, like other
plays, but usually the performers
merely agree on the plot and fill in
the dialogue to suit themselves, as
the play goes on.

For an evening's amusement, the
company may be divided into two
parties, each with a leader. One of
the parties acts a charade while the
other forms the audience and tries to
guess the word represented, and
then the parties change places.

A word or syllable may be acted
by being actually represented, or by
being mentioned frequently. Thus,
the syllable "car," in the above exam-
ple may be acted by representing the
interior of a car, with passengers
and conductor, though the word
itself is not once spoken, or any other
scene may be given in which a car is
a subject of conversation. Of these
two methods, the former is the best
where it is possible. Charades are
most enjoyable when there has been
least preparation. Scenery and cos-
tumes should be made from the
materials nearest at hand. The
leader should act as stage manager
and the other players should obey
him exactly. He should tell each
what to do, taking advice and sug-
gestions from the others, but always
deciding himself on the course to be
followed. It is better merely to in-
dicate the general plot, leaving the
players to use what words occur to

them at the moment. Two persons
can thus often make a very comical
dialogue without any previous re-
hearsals, and, as all are equally with-
out preparation, a failure is not dis-
graceful.

CHECKERED GAME OF LIFE,
a game played by two persons on a
checkered board, with counters and
a TEETOTUM. The squares bear
numbers and also pictures descrip-
tive of different events in a man's
life, beginning with his birth and
ending in various ways, some success-
ful, others not, the object being to
reach the Temple of Fame at the top
of the board. The players each
enter in turn a counter in the first
square, and their course of play is
determined entirely by twirling the
teetotum, there being no skill in the
game. He who first reaches the
Temple of Fame wins.

This is the type of a great number
of games, all probably derived from
Backgammon or Patchesi, and many
having for an object the combination
of instruction with amusement. The
oldest of such games was probably
the Game of Goose, which was play-
ed as long ago as 1800. This was
called in France *Jeu de l'Oie* (Game
of Goose), and in an old French col-
lection many similar games are de-
scribed, among them those of "His-
tory," "The Revolution," "The
Atlas," "The Navy," and "The
Monuments of Paris."

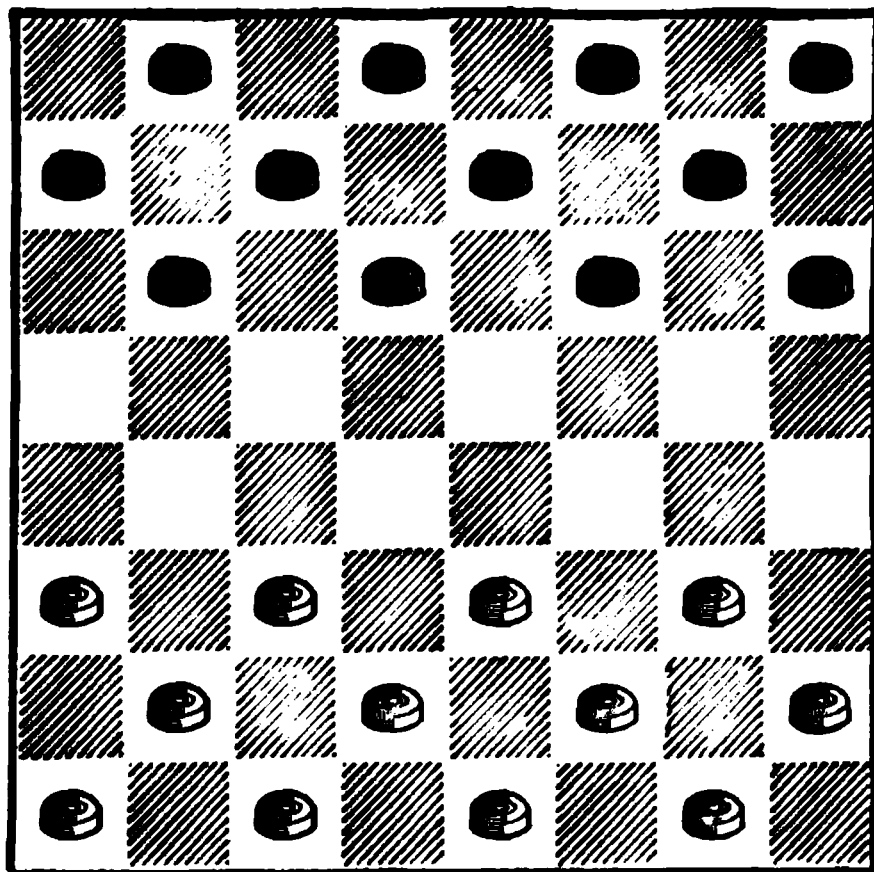
CHECKERS (called Draughts in
England), a game played by two
persons, each of whom has 12 pieces
or men, on a checkered board divided
into 64 squares of two colors, gener-
ally black and white. It may be
played either on the black squares,
as it usually is in America, or on the
white squares, as it always is in
England, but on whichever color it
is played, the board must be so placed
that a square of the same color shall
be in the lower left-hand corner. In
the accompanying diagrams, for con-
venience of illustration, the game is
supposed to be played on the white

squares. The checkers, or men, which are also of two colors, and are all equal, are arranged at the beginning of the game in three lines on each side, as shown in Fig. 1:

The players take turns in moving, and each has but one move at a time. The men are moved diagonally (corner-wise), one square at a time, either to the right or to the left, but always forward. If, however, a man reaches the last line of squares on the opposite side of the board, it becomes a King, is covered by having another one put upon top of it (or sometimes by turning it over, if it is

made with a crown on the under side), and it may then move either backward or forward, but still only one square at a time. When two hostile men meet each other, the one having the move can capture the other, if there is a vacant square next beyond it, by jumping over it into that square. The man thus jumped is removed from the board. If several men are exposed with a vacant square behind each, they may all be jumped at once and all removed from the board, the capturing man being left on the last square occupied. If a man be in a position to be taken, the player having the move must capture it. If he neglect to capture it and make some other move, the opponent may let the move stand and remove from the board the man which ought to have made the capture. The man thus forfeited is said to be huffed, or "blowed," sometimes accompanied with the gesture, and the player who thus huffs has then the right to make his own move, for the act of huffing does not count as a move. If, however, the player having the right to huff prefers not to do so, he may insist on his opponent's capturing the piece, and then the

man improperly moved must first be replaced on the square from which he was moved. As two or three men may sometimes be captured at once, the player neglecting to take all of them may be huffed by his opponent. This often happens to young players, who do not readily see all the men which may be jumped. The object of the game is to capture all the men of the opposite player, or to block them so that they cannot move. If, towards the close of a game the two players are so evenly balanced that neither can win—as, for example, when each has



Checker Board.

Fig. 1.—Arrangement of Men.

one king—the game is said to be drawn.

The Move. The player who occupies such a position on the board that in the ordinary course of play he can force his opponent's men into a confined position is said to "have the move." There are several ways of finding out who has the move, which will be learned easiest by playing with some one who understands the game, or by playing through the games given below. When one has not the move, one can

often win it by skillful playing. Having the move does not mean having the first move, for the first player has no advantage over his opponent. The second player really has the move, but it is of no advantage to him so early in the game. During the game the move is sometimes with one and sometimes with the other side, but the skillful player will generally keep it at the close of the game. It is customary to number the squares of the board in the way shown in Fig. 2, as the moves of the game are always given by numbers, as in the columns below. By playing through these games, the beginner will easily learn what are the best moves on each side.

Openings. There are a great many ways of beginning the game of Checkers. These, which are called "openings," have generally received special names. Some of them are given below:

The Ayrshire Lassie:

11—15 24—20
8—11 28—24

The Bristol:

11—16 24—20
16—19

Sometimes any game begun by the move 11—16 is called Bristol.

The Cross:

11—15 23—18

The Defiance:

11—15 23—19
9—14 27—23

The Dyke:

11—15 22—17
15—19

The Fife:

11—15 23—19
9—14 22—17

The Glasgow:

11—15 23—19
8—11 22—17
11—16

The Laird and Lady:

11—15 23—19
8—11 22—17
9—13

The Maid of the Mill:

11—15 22—17
8—11 17—13
15—18

Checker Board.

Fig. a.—Method of Numbering.

The Old Fourteenth:

11—15 23—19
8—11 22—17
4—8

The Invincible:

11—15 24—19

The Single Corner:

11—15 22—18

The Souter:

11—15 23—19
9—14 22—17
6—9

The Whilter:

11—15 23—19
9—14 22—17
7—11

The Will o' the Wisp:

11—15 23—19
9—13

The "Bristol" was so named by the player Anderson in compliment to the checker players of Bristol, England. The "Defiance" is so

named because it prevents the formation of the "Fife" game. The "Dyke" is so called because in many of its positions the men are formed in lines. The "Fife" was named in 1847 after Wylie, a player from Fifeshire, Scotland. The "Glasgow" was named in like manner from Sinclair of that city in 1828. The "Laird and Lady," "Maid of the Mill," and "Souter" (shoemaker) were named from people whose favorite openings they were. The "Old Fourteenth" was the fourteenth game in Sturges's work on checkers. The "Whilter" (a Scotch word, meaning a confusing change), and the "Will o' the Wisp" are named from the unexpected plays they often introduce.

Sample Games. In these games Black is supposed to be at the top and White at the bottom of the board. Care should be taken to crown each man that reaches the king-row.

GAME I.

BLACK.	WHITE.
11 to 15	22 to 18
15 " 22	25 " 18
8 " 11	29 " 25
4 " 8	25 " 22
12 " 16	24 " 20
10 " 15	27 " 24
16 " 19	23 " 16
15 " 19	24 " 15
9 " 14	18 " 9
11 " 25	32 " 27
5 " 14	27 " 23
6 " 10	16 " 12
8 " 11	28 " 24
25 " 29	30 " 25
29 " 22	26 " 17
11 " 15	20 " 16
15 " 18	24 " 20
18 " 27	31 " 24
14 " 18	16 " 11
7 " 16	20 " 11
18 " 23	11 " 8
23 " 27	8 " 4
27 " 31	4 " 8
31 " 27	24 " 20
27 " 23	8 " 11
23 " 18	11 " 8
18 " 15	

Black wins.

GAME II.

BLACK.	WHITE.
9 to 14	22 to 18
11 " 15	18 " 9
5 " 14	25 " 22
15 " 19	23 " 16
12 " 19	24 " 15
10 " 19	22 " 17
6 " 10	27 " 24
16 " 15	17 " 10
7 " 14	29 " 25
8 " 11	25 " 22
14 " 18	22 " 17
18 " 22	17 " 14
22 " 25	21 " 17
25 " 29	17 " 13
4 " 8	32 " 27
3 " 7	24 " 20
15 " 18	14 " 9
19 " 23	26 " 19
18 " 22	27 " 24

White wins.

GAME III.

WHITE.	BLACK.
22 to 18	11 to 16
25 " 22	10 " 14
24 " 20	16 " 19
23 " 16	12 " 19
18 " 15	7 " 10
20 " 16	14 " 18
29 " 25	9 " 14
27 " 24	5 " 9
24 " 20	8 " 12
31 " 27	1 " 5
15 " 11	10 " 15
22 " 17	18 " 22
17 " 1	22 " 31
11 " 8	4 " 11
16 " 7	3 " 10
1 " 6	31 " 24
6 " 13	5 " 9
13 " 6	2 " 9
30 " 26	9 " 14
26 " 22	14 " 18
22 " 17	19 " 23
28 " 19	15 " 24
17 " 14	

Drawn.

RULES OF THE GAME.

1. The choice of men and the first move in the first game must be decided by lot ; the most common way is for one of the players to hold one of the men in his hand, and let the

other guess whether it is black or white. The winner of the choice has the right either to play first or to call upon his opponent to do so. After the first game, the men should be changed each game, so that each player shall use the black and the white by turns, and not become so accustomed to either as to be unable to use the other, and the first move is to be taken by turns, whether the game be won or drawn.

2. Neither player must touch the squares of the board nor point at the board with his finger, and never touch a piece unless he means to move it.

3. If the men get out of place, a player may first tell his opponent that he intends to replace them and then do so; but if, after they are set right, a player touches a piece, it being his turn to play, he must move it, if possible.

4. When a man is in a position to be taken, the player having the move must capture it; and the opposite player may insist on his doing so, or may huff the man having the right to capture, as he chooses. After huffing, the player may then make his own move.

5. No matter how long a man has been liable to capture, it may at any time be huffed, or the opponent may at any time be obliged to capture it.

6. When two or more men are liable to capture, the player having the move may take whichever he chooses; for example, if one can be captured in one way and two in another way, he may take either the one or the two.

7. If a player delays moving more than three minutes, his opponent may request him to play; and if he does not move within five minutes after being requested to, he loses the game.

8. When, near the close of the

game, only a few men are left, the player having the stronger force may be compelled at the pleasure of the referee to finish within a certain number of moves; and, if he cannot do this, the game is declared drawn. [For example, if two kings remain against one king, the referee might require the former to win in twenty moves—that is, twenty on each side.]

Give-Away, or the Losing Game, a game having the same moves and rules as checkers, in which the player who first gets rid of all his men wins. The object of each player is to force his opponent to capture as many men as possible, and, by opening his own

Fig. 3.—Polish Checkers.

game freely, especially the squares in his king-row, to compel him to make kings. It is thus the opposite of checkers. Although not so difficult to play as the latter, it requires considerable skill and attention to play well. Great care is necessary to keep the move, for the player who has it ought to win.

Polish Checkers. The board and the men are arranged as in common checkers and the moves of the men are the same—that is, always forward diagonally, and one square at a time; but in capturing, the men

have the privilege of jumping either forward or backward. When a man reaches the opposite King-row, it is crowned a king as in the other game, but it has far greater powers, similar to those of a bishop in chess. It may move not only one square at a time, backward or forward, but it has also the privilege of passing over several squares, and even the whole length of the diagonal, when the passage is free, at one move. The method of capture, both of the men and of the kings, may be explained easiest by Fig. 3, the game being supposed to be played on the white squares, as it generally is in Europe.

If White has a man at 20, and Black has unsupported men at 16, 7, 6, 14, 23, and 24, White, having the move, may capture them all and finish at square 20 again. In this long jump or succession of jumps, White, it will be noticed, enters the opposite King-row at 2, but does not stay there, for he is obliged to keep on jumping until he has captured all the men which can be taken; and he does not thus win the right to be made a king, as that can be only when the man remains in the King-row. Good players will take advantage of this, when they cannot keep their opponent from getting into their King-row, and by putting a man or two in the way of capture, lead him out of it again into the middle of the board. It is sometimes good play to throw away even three men, especially toward the end of a game, to keep the enemy from getting a King. The men jumped must not be removed from the board until the capturing man has finished and is at rest, because the latter cannot pass twice over any square with a man on it, but must stop behind that man which, but for this rule, it might jump. But a vacant square may be

passed or repassed several times in the course of one move, provided that no man is leaped a second time. The king has even more power than the bishop in chess, for in moving he may not only pass from one end of the board to the other, but in capturing he may also make angles. For instance (Fig. 4), if a king stand at 18, he may move to any square on the line from 4 to 29, or from 5 to 32. Again, if a White king stands at 31 and Black men or kings are at 22, 6, 16, and 24, the former captures them all by jumping to the squares 13, 2, 20, and 27, where he rests. From this it will be seen that

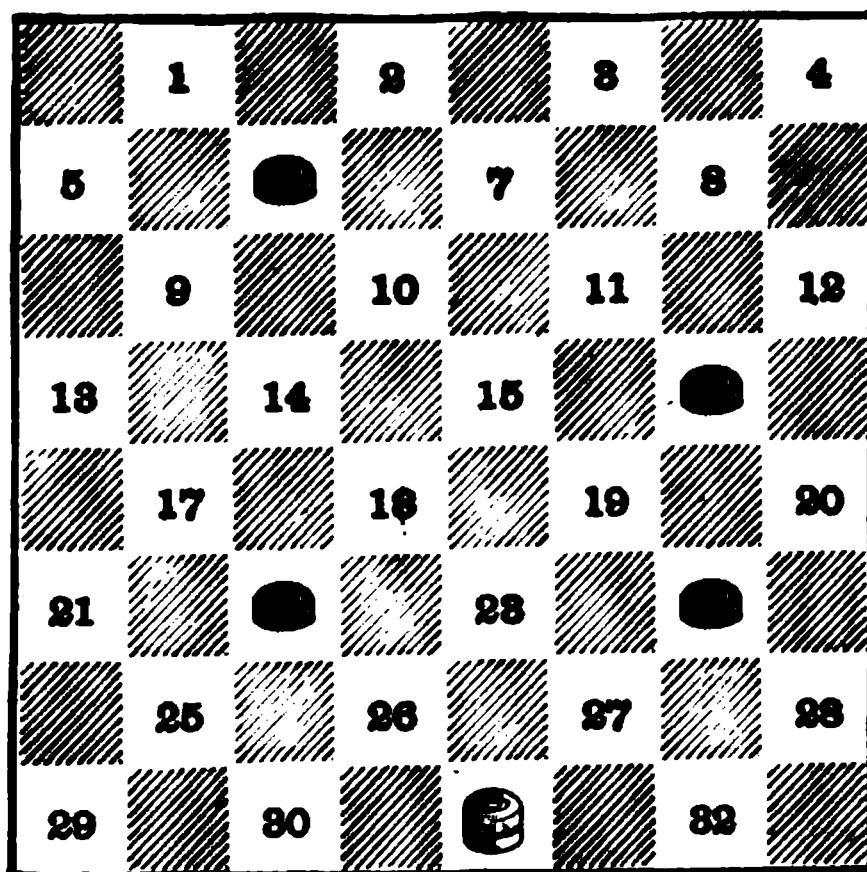


Fig. 4.—Polish Checkers.

though the common man can jump a piece only when there is a vacant space next beyond it, the king can pass to any empty square on the diagonal. The king having so great power can keep out of his opponent's way much more easily than in common checkers, and with skillful players many games are drawn. If, at the end of a game, White has only one king while Black has three, White can draw the game if he can get on the central line between 4 and 29, and know how to play properly. If he cannot get on the central line,

Black may win in several ways, but the game is drawn if he does not do it in fifteen moves. When a player who has only one king, while his opponent has a king and two men, offers to crown the two men so as to oblige him to win in fifteen moves, the opponent must accept the offer or the game is drawn. When at the end of a game, one party has a king and a man against three kings, it is best to sacrifice the man as soon as possible, as the game is more easily defended by a king alone. When two men of one color are so situated that an opponent can move between

each player having 20 men arranged in four rows; but in Germany it is often played as in America—on a common checker-board of 64 squares, with the usual number of men.

Pyramid, a game in which the men are arranged in the form of a pyramid, as in Fig. 5. The moves are always diagonally forward, and hostile men must be jumped as in checkers, but the man jumped is not removed from the board. The player's object is to form his men in the same pyramid that was occupied at first by his enemy, and he who does this soonest wins. This is the

simplest game that is played on a checker-board, though considerable skill may be shown in moving the men and getting them in position.

Halma, or Hoppity, a kind of PYRAMID played on a checker-board of 256 squares by two or four persons with men shaped like the Pawns in CHESS, though common checkers may be used, as shown in Fig. 6. In the two handed game each player has 19 men which are placed closely together in opposite corners of the board, as in Fig. 6, occupying both dark and light squares. The player's object, as in Pyramid, is to move his own men into the places of their opponents,

Fig. 5.—Pyramid.

them, and thus be in a position to leap either way, it is called a lunette. This situation happens much oftener in the Polish than in the common game, and it is frequently a snare laid by good players to catch the unskillful; for by moving into the lunette in hope of catching one of his opponent's men the poor player often finds himself entrapped and forced to lose several of his own. With these few exceptions the rules of Polish checkers are the same as those for common checkers. This game is usually played on the continent of Europe on a board with 100 squares,

but either friends or enemies can be jumped, and in any of the possible eight directions, which increases the interest. The simple move can also be made in any direction. In playing, an arrangement of the pieces in a row with an empty space between each two, into which a man may jump, is called a ladder, because a piece can sometimes go from one end to the other in a single move, by a series of leaps. Ladders should be arranged as much as possible where they will aid the player's own men, and avoided where they will help his opponent. The game may

be divided into three parts, the first part called the Gambit, which consists in getting all the men outside the squares originally occupied; the second or *Melée*, when the opposing men are mingled; and the third or Packing, getting the pieces into order on the opposite side. When four

persons play, each has but 13 men, arranged in the same kind of a figure as in the two-handed game. Each may play for himself, or the opposite players may be partners, in which case each tries to help the other as much as possible, instead of hindering him.

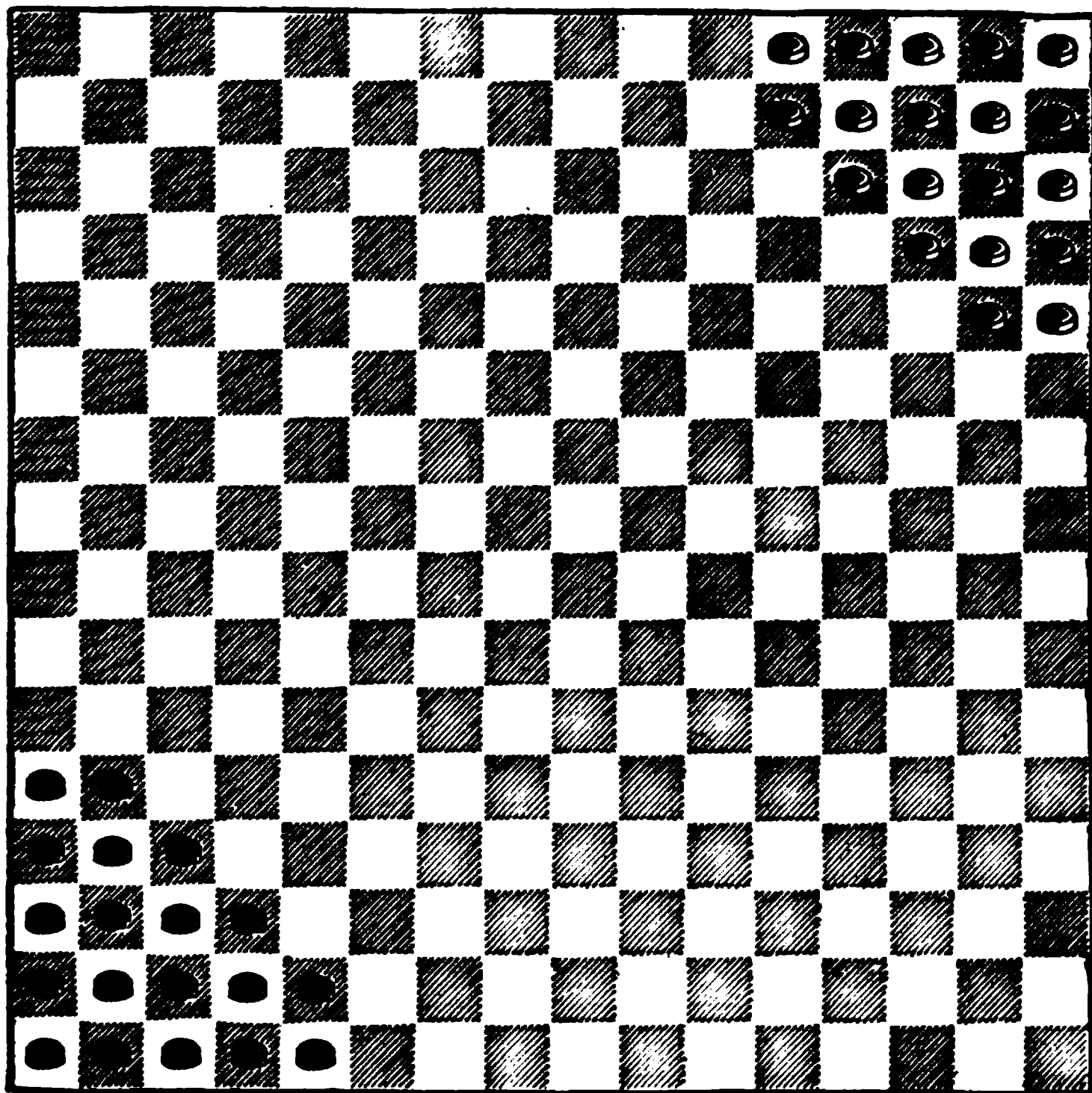


Fig. 6.—Halma.

Japanese Checkers. This is played on a board like the one in the figure made from one of 100 squares by joining alternate pairs, forming oblong figures, which are the only ones used in playing (See Fig. 7.)

Each of the players, who sit opposite, has 9 men like Pawns in chess, though ordinary checkers may be used, as in the illustration, and also

a Mikado, and a Daimio. The Mikados and Daimios are like the men in shape, but of different size, the former being the larger. Each player places five men in the row nearest him, and four men with the Mikado in the second row, the Mikado being in the middle, as at M in the diagram. No man can jump the Mikado, but for the

first one that reaches the King-row a Daimio is substituted, who is allowed to jump the Mikado. In all

other animals. How the Egyptians played the game is not known, but the modern Egyptians play it just as we do. It was not known in Europe until about the sixteenth century, when it is supposed to have been brought from the East. The word checkers is derived from the squares of the board. Draughts means simply moves. In Italy the game is called *dama*, and in Germany *Damen*, both of which mean ladies; and in France it is called *Le jeu de dames*, the Ladies' Game. In all these countries, where the Polish game is mostly played, the king is called the queen. The prin-

Fig. 7.—Japanese Checkers.

other respects the game is precisely like ordinary checkers.

History. The game of checkers is supposed to be older than chess. A game somewhat like it was known in Egypt more than four thousand years ago, and pictures representing King Rameses II, called Sesostris by the Greeks, who lived about 1400 B.C., playing it with some of the women of his household are still to be seen on the walls of his palace at Thebes. One of these is shown in the accompanying illustration, in which only the edge of the board is seen, but the checkers are like little ten-pins.

Other forms of Egyptian checkers are shown in the following, taken from pictures on temples or from real pieces found in the tombs. Some of these are made of ivory and some are earthenware; and some of them have heads of cats, dogs, and

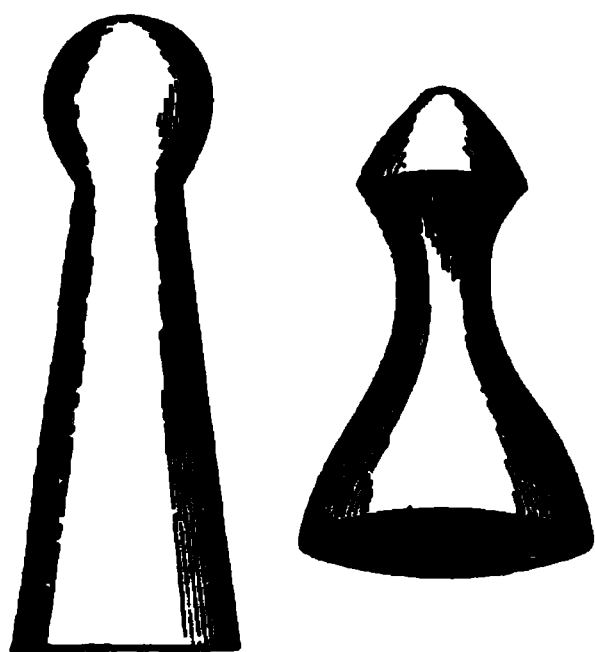
principal draught-games played by the ancients were the *Ludus Latruncularum* (Soldiers' Game) of the Romans, and the *Plinthion* or *Polis*



Rameses II. playing Checkers.

(*πολις*) of the Greeks. In both of these a man could be captured only by placing an opponent's man on

each side of him. The Greeks called the men Dogs. The donkey boys in Cairo, Egypt, play a game like this, and some think Alexander the Great carried it to Egypt. The Chinese have a Checker game called *Wei-Chi* (Game of Circumvention), in which a man is taken by being surrounded with four hostile men. Captain Cook found the Sandwich Islanders playing a Checker game with black and white pebbles on a board of 14 by 17 squares. Some writers think that our Checkers is



Egyptian Checkers.

not derived directly from any of the ancient games, but is a lower form of CHESS, which in its turn was developed from an old Hindoo Draught game.

CHEMICAL EXPERIMENTS.

These should be tried if possible in a room used for nothing else, in the attic, the cellar, or an outbuilding. Old clothes must be worn, or, better still, an apron with sleeves, made to cover the whole body. A plentiful supply of water should be at hand. An old table or a large packing box may be used to try the experiments on. The different experiments are told about in separate articles, but processes used in all or several of them are described here to avoid repetition.

Heating. This may be done by an ordinary alcohol lamp, or, where there is gas, with a Bunsen burner (Fig. 1),

to be bought at a chemical warehouse, which gives a hot flame without much light. An ordinary lamp

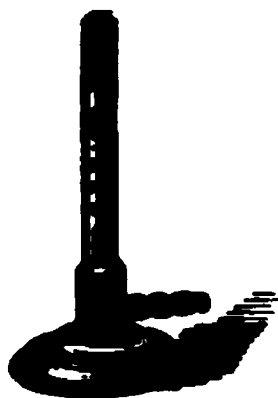


Fig. 1.—Bunsen Burner.

or gas flame would deposit soot on the vessel heated. A home-made Bunsen burner can be obtained by inverting a glass funnel over a gas jet as shown in Fig. 2. The gas mixes with air and burns without smoke.

When gas is used the burner is connected with an ordinary gas burner by rubber tubing. When a glass vessel is to be heated it should be placed on a piece of wire gauze, shaped to receive the bottom. The gauze is laid on an iron ring with three legs by which it is held over the lamp. These rings, called tripod stands, (Fig. 3) can be bought, but four pieces of strong wire laid cross-wise, their ends resting on blocks of wood, will do. To heat the contents of a vessel slightly, it is placed over a water bath, which can be made of

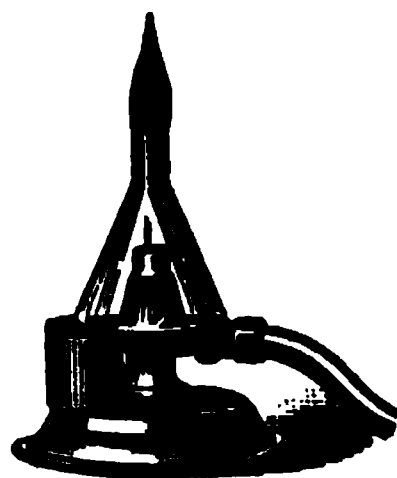


Fig. 2.—Home-made Bunsen Burner.

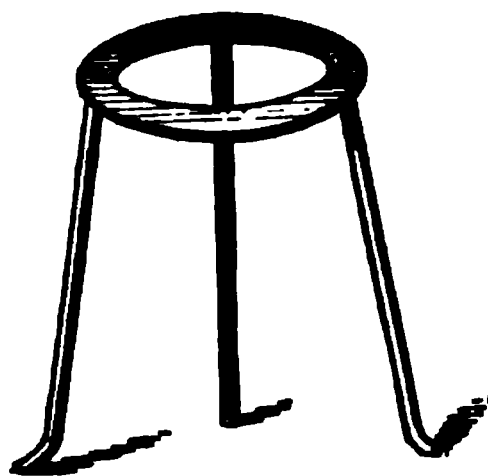


Fig. 3.—Tripod Stand.

a tin patty-pan with a cover of tin in which a hole has been cut with strong scissors. The hole must be the same size as the bottom of the

flask or bottle to be heated. Partly fill the pan with water, put the flask in the hole, and then boil the water.

Glass working. To bend glass-tubing hold it in the tip of the lamp flame as shown in the picture, turn-



Fig. 4.—Bending Glass Tube.

ing it slowly around and moving it forward and backward to heat a considerable length of it. The sense of feeling will tell when it can be bent. Bend it slowly and carefully, removing it from the flame, and putting it back when it needs to be softened more. Practice will enable any one to make a good bend. Do not bend at a right angle but make a succession of gradual bends, carrying the tube around in a curve. To make a glass jet, heat as before, draw the ends of the tube straight apart till the heated part is about as large as the lead in a pencil. When cool, scratch this neck with a file, when it will easily break. Two pieces of glass tubing may be united by melting the ends and pressing them together, but a better way is to use a piece of rubber tubing, which makes a flexible joint. Ordinary tubing can be broken squarely off by first making a scratch with a three-cornered file, and then breaking it. If the glass and the working tool be kept wet with spirits of turpentine, tubes can be filed completely apart or a hole can be bored through a sheet of glass with a rat-tail file.

Collecting Gases under Water. Fill a pan with water deep enough to cover entirely the jar in which the gas is to be collected, when laid on its side. Lay the jar on its side till it is full of water, and then turn it mouth downward, the opening being kept under water. The water will not run out of the jar. If there is the least bubble of air in it the filling must be done over again. Support the jar on two strips of wood, so that its mouth will still be under water, or stand it on a tin saucer, turned upside down, having a hole cut in its side and one in its bottom, as shown in Fig. 5. Fasten to the end of the glass tube leading from the bottle in which the gas is made, a piece of rubber tubing about two feet long. Push the end under the saucer through the hole in the rim, and up in into the jar through the hole in the top. As the gas is made, it will bubble through the water to the top of the jar, where it collects, pushing the water gradually out at the bottom.

Filtering. To separate a powder from a liquid it is necessary to use filter paper which may be bought in small circular pieces. Fold one of the pieces, A, as shown in Fig. 6 at B, expand it as at C, and placing it in a glass funnel, as at D, pour upon it the mixed liquid and powder. The

Fig. 5.—Collecting Gases under Water.

liquid will slowly pass through the paper, leaving the powder behind.

Gas-holder. Where gases are to be kept in any considerable quantity, a gas-holder is needed. It may be bought of a dealer in chemist's

materials, or made as follows. Take two tin pails, one about two inches less in diameter than the other, and several inches shorter. Remove the handles of both, and have a tinman cut a hole in the bottom of the smaller pail, soldering to it a tube about an inch long, and just large enough to fit tightly the size of rubber tubing you wish to use. Fill the larger pail with water, and press the other down into it, letting the air escape through the tube. When all the air is replaced with water, slip a piece of rubber tubing over the tin tube and connect it with the bottle

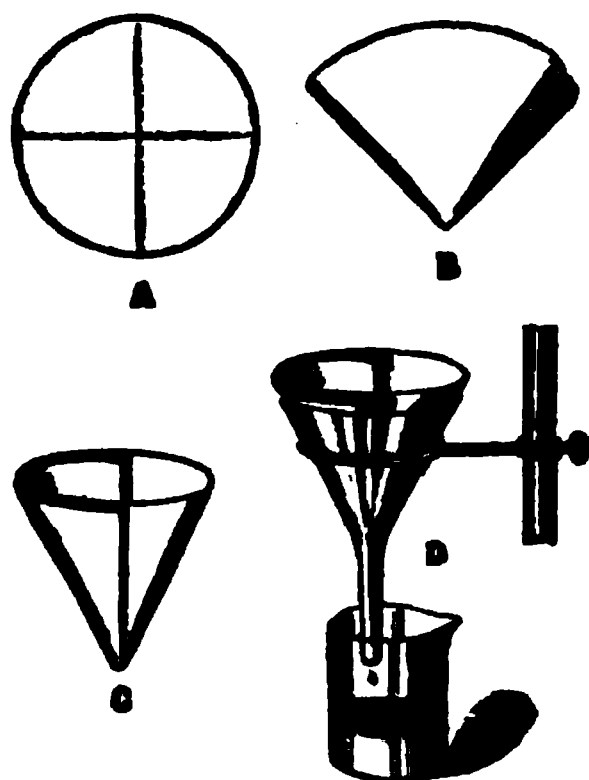


Fig. 6.—Filtering.

where the gas is making. As the gas enters the upper pail, the pail will rise in the water. When enough has been collected, close the rubber tube with a pinch cock, to prevent the gas from escaping till it is wanted. When gas is wanted, remove the pinch cock and place a slight weight on the upper pail. Another kind of gas-holder which can be bought, is made of rubber, like a bag.

Corks. Choose corks that are cut across the grain rather than with it, as they are tighter. Corks may also be made tighter by dipping them in melted paraffine. To fit a glass tube in a cork, bore a hole in the cork a little smaller than the tube, using a

sharp knife or, better, a cork-borer (see list below). Moisten the tube, and work it through the hole. Rubber stoppers with one or more holes may be bought, and the holes not in use may be plugged with pieces of glass rod. When they get hard they may be softened by soaking them in turpentine. Ordinary corks may be softened and made easier to bore by rolling them under foot.

The chief things needed to perform the experiments described in this book, besides those mentioned above, are given below in an alphabetical list, with the prices for which they can usually be obtained, though these vary a good deal.

ARTICLES FOR CHEMICAL EXPERIMENTS.

Alcohol. Price, about 60 cents a quart.

Alcohol Lamp. Price, 30 to 50 cents.

Ammonia Water. Strong. Price about 40 cents a quart.

Antimony. Price, 20 cents a pound.

Balance. Useful for weighing, but not necessary, as the druggist will weigh substances in the desired amounts when they are bought.

Bismuth. Ask for metallic bismuth. Price, about 20 cents an ounce.

Bisulphide of Carbon. Be careful not to bring it near a flame, as its vapor is very inflammable. Price, 20 cents a pound.

Bituminous Coal. This can be obtained of a blacksmith, if no dealer is near.

Blue Vitriol or Copper Sulphate. Price, 8 cents a pound.

Caustic Soda. Price, 15 cents a pound.

Chalk. Ask for carpenter's chalk, Blackboard crayons are not made of real chalk. Price 3 cents a pound.

Chlorate of Potash. Price, 25 cents a pound.

Copper. Scraps can be obtained of a plumber. Old cartridge shells

may be used. Price of clippings at a chemist's, 40 cents a pound.

Cork Boreers. In sets of 6; price, about \$1.

Deflagration or Combustion Spoon. Price, 15 cents. One can



Fig. 7.
Deflagra-
tion
Spoon.

be made by attaching to a wire a piece of chalk with a hollow scooped in it.

Drying Bottle, a bottle to dry gases. The stopper must have in it two tubes. The one by which the gas enters reaches nearly to the bottom, the other by which it leaves is short. Fill the bottle with lumps of unslaked lime, or with pumice stone soaked in strong sulphuric acid.

Dutch Leaf. In "books"; price, 15 cents.

Files. About 6 inches long; price, 30 cents.

Filter Paper. Price, from 8 cents to 82 cents per hundred sheets, according to size.

Fish Globe. Price, about \$1.

Flasks. Half-pint size, 15 cents apiece. The flasks in which olive oil sometimes is sold can be used.

Fluor Spar. Price, 10 cents a pound.

Funnels. Price, about 10 cents apiece.

Glass Tubing and rods (ask for soft glass). Price, 35 cents a pound. $\frac{1}{8}$ inch inside diameter is about the size needed for tubes, but if rubber stoppers are used the tubes should be bought to fit the holes in the stoppers.

Gold Leaf. In "books"; price, 40 cents.

Graduated Tube or "graduate." Price, about 50 cents. One good enough for the experiments in this book can be made by scratching lines on a test tube a quarter of an inch apart.

Fig. 8.
Graduate.

Hydrochloric Acid (ask for it "chemically pure"). 20 cents a pound.

Ignition Tubes, for making oxygen. Price, 20 cents.

Iodine. Price, 35 cents an ounce.

Iron Sulphide. Price, 15 cents a pound.

Jars, or wide-mouthed bottles. Fruit jars or pickle bottles can be used. "Bell jars" or receivers cost from 45 cents to \$5, according to size.

Jets of glass; directions for making given above.

Lamp Black; directions for making in article CARBON.

Lead, Sugar of, or Acetate of Lead. *Deadly poison.* Price, chemically pure, 10 cents an ounce.

Lime, unslacked (caustic lime). Price, 5 cents a pound.

Lime Water. Made by dissolving a little unslacked lime in water and letting it stand till clear.

Lime, Chloride of, or "bleaching powder." Price, 10 cents a pound.

Litmus. Price, 10 cents an ounce.

Magnesium Ribbon. Price, 75 cents an ounce.

Manganese Dioxide, or black oxide. Price, 15 cents an ounce.

Marble, lumps of, can be obtained at a marble cutter's for little or nothing.

Mercury. Price, 60 cents a pound.

Mercury, Red Oxide of. Price, 10 cents an ounce.

Nitric Acid, chemically pure. Price, 17 cents a pound.

Phosphorus. Price,

15 cents an ounce. Keep in a bottle of water, and never touch with the naked hand.

Pinch Cock, for closing rubber tubing. Price, 30 cents.

Potassium. Price, 50 cents a drachm.



Fig. 9.—Pinch
Cock.

Rubber Stoppers. Price, \$2.25 per pound. Get them to fit the flasks and bottles you intend to use.

Sal Ammoniac. Price, 10 cents a pound.

Sugar of Lead. See Lead.

Sulphur. Price, 5 cents a pound. Comes in two forms: roll or stick sulphur, called also brimstone, and flowers of sulphur, or powdered sulphur.

Test Tubes. Size $5 \times \frac{3}{4}$ inches. Price, 35 cents a dozen. Old medicine phials will sometimes serve the purpose.

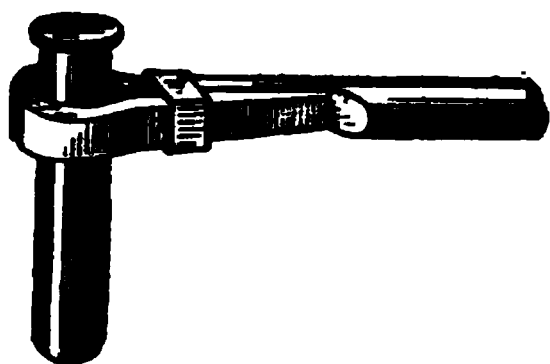


Fig. 10.—Test Tube and Holder.

Thistle Tube. Price, about 16 cents.

Test Tube Holders. (A folded strip of paper, passed around the tube, is a good substitute).

Tin. Pure tin-foil. Price, 10 cents an ounce. Common tin-foil often has lead in it.



Fig. 11.—Thistle Tube.

Tripod. Small size. Price, 20 cents.

Turmeric Paper. Price, 80 cents a quire. A few cents worth is all that is needed.

Turpentine, Spirits of. Price, 20 cents per pint.

U-shaped Tubes. Price, about 10 cents each.

Universal Support (see Fig. 12.) Price, \$2.

Watch Spring, old, to be obtained of any watchmaker.

Wax, yellow. Price, 45 cents a pound.

Wire. All kinds to be bought at a hardware store.

Wire Gauze. Price, a few cents a foot.

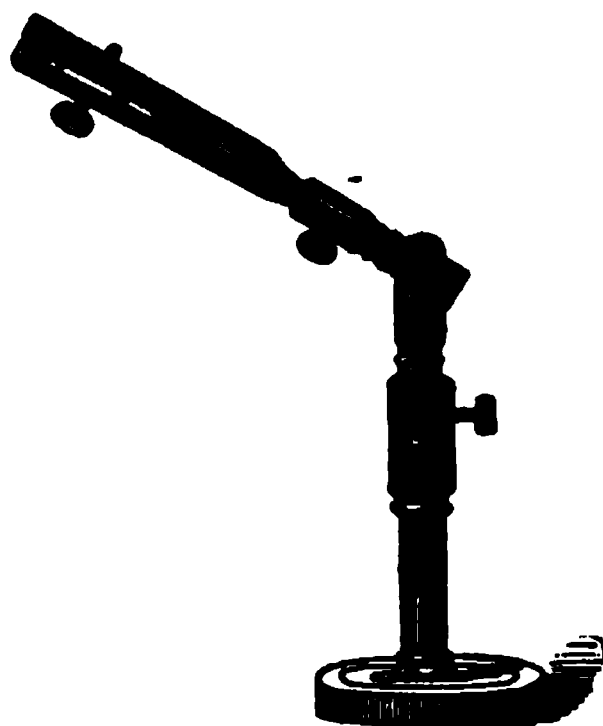


Fig. 12.—Universal Support.

Yeast. Small yeast cake, costs 2 cents at a grocery.

Zinc, granulated, for making hydrogen. Price, 30 cents a pound. Clippings of old zinc will do.

CHESS, a game played by two persons on a board containing 64 squares, of two colors arranged alternately, generally black and white or red and white. Each player has 16 chess-men, of a different color, each consisting of eight "Pieces" and eight "Pawns." The Pieces are King, Queen, two Rooks or Castles, two Bishops, and two Knights, and each of these has a Pawn, or soldier. The men are generally carved figures, but sometimes round, flat pieces, with the figures of the men on the top.

At the beginning of the game the board should be so placed as to have a white square at each player's right. The lines of squares running up and down the board are usually called "files," those from right to left "ranks" or lines, and those cornerwise "diagonals." By a simple system, each square on the board has a name taken from the piece commanding it at the beginning of the game. This is most easily shown in the following diagram, Fig. 1:

It will be seen that the square on which the King stands at the beginning of the game is named the King's square, the one in front the King's 2d, next the King's 3d, 4th, 5th, 6th, 7th, and 8th. These count the same from the other side of the board, so that one player's King's 8th square is the other player's King's square. The Queen's squares are named in the same way; and the Bishops, Knights, and Rooks are named King's Bishop, Knight, or Rook, or Queen's Bishop, Knight, or Rook, according as they stand on the King's or the Queen's side. The Pawns are named after the pieces in front of which they stand, thus: King's Pawn, Queen's Pawn, King's Bishop's Pawn, Queen's Rook's Pawn, etc.

Q.R.8d.	Q.Kt.8d.	Q.B.8d.	Q.8d.	K.8d.	K.B.8d.	K.Kt.8d.	K.R.8d.
Q.R.7.	Q.Kt.7.	Q.B.7.	Q.7.	K.7.	K.B.7.	K.Kt.7.	K.R.7.
Q.R.6.	Q.Kt.6.	Q.B.6.	Q.6.	K.6.	K.B.6.	K.Kt.6.	K.R.6.
Q.R.5.	Q.Kt.5.	Q.B.5.	Q.5.	K.5.	K.B.5.	K.Kt.5.	K.R.5.
Q.R.4.	Q.Kt.4.	Q.B.4.	Q.4.	K.4.	K.B.4.	K.Kt.4.	K.R.4.
Q.R.3.	Q.Kt.3.	Q.B.3.	Q.3.	K.3.	K.B.3.	K.Kt.3.	K.R.3.
Q.R.2.	Q.Kt.2.	Q.B.2.	Q.2.	K.2.	K.B.2.	K.Kt.2.	K.R.2.
Q.R.1d.	Q.Kt.1d.	Q.B.1d.	Q.1d.	K.1d.	K.B.1d.	K.Kt.1d.	K.R.1d.

Fig. 1.—Method of Notation.

The following are the abbreviations used :

K	-	-	-	-	-	King
Q	-	-	-	-	-	Queen
B	-	-	-	-	-	Bishop
Kt.	-	-	-	-	-	Knight
R	-	-	-	-	-	Rook
P	-	-	-	-	-	Pawn
Sq.	-	-	-	-	-	Square
Ch. or +	-	-	-	-	-	Check

Dis. Ch. - - Discovered Check
† - - - Checkmate
X - - - takes
A move is described by giving the name of the piece and the square to which it is moved. Thus, Q to K.B. 4, or simply Q—K.B. 4, means that the Queen is moved to King's Bishop's fourth square.

In the diagrams in this article the pieces will be designated thus :

King, 

Queen, 

Bishop, 

Knight, 

Rook, 

Pawn, 

At the beginning of a game the men are set as in Fig. 2.

By means of this simple notation games not only can be completely described on paper in a brief space, but they can be played by telegraph or post, the contestants being hundreds or thousands of miles apart. Very skillful players are also thus enabled to play games blindfolded, the moves being described to them as they are made. Paul Morphy, a celebrated American player, could carry on eight games at once in this way, without seeing any of the boards.

The first move being decided, the players take turns, each moving one man at a time. The men are moved each in a different way, as described below, but no piece except the Knight can pass over another man in moving. When a man can be moved to a square occupied by a hostile man, the move can be made, and the hostile man, which is said to be taken, or captured, is removed from the board. A man is said to "command" any square to which it can move, and a man that can be captured is said to be "*en prise*" (French for "in position to be

taken"). Each player's object is to "checkmate" his opponent's King, and to effect this he endeavors to weaken his enemy's force by capturing as many of his men as possible. How the King is checkmated will be described below.

MOVEMENTS OF THE MEN.

King. The King can move but one square at a time (except in castling), but this move may be forward, backward, sidewise, or diagonally in either direction. Unless he is on the edge of the board he thus commands eight squares. The King is the only piece that cannot be taken. When the square on which he stands is commanded by an enemy's piece he is said to be "in check." He is not allowed to move into check, even to take a man, and a square on which he would be in check is therefore said to be "guarded." When

BLACK.

WHITE.

Fig. 2.—Method of Setting the Men.

either player moves any of his men so as to put his opponent's King in check he must cry "check!" as a warning, and the King is then said to be "attacked." If a player checks by moving out of the way a piece that was between the King and the

checking piece, it is called a "discovered check." If, at the same time, the moved piece also gives check, it is called a "double check." The player whose King is in check must either move him out of check, move a man between him and the checking piece, or capture the latter. When none of these things is possible, the King is checkmated, and his side has lost the game. As stated above, the object of each player is to checkmate his opponent, and all the moves are made with this end in view. When the King, though not in check, cannot move without going

Queen's Rook on Queen's square. This move has a double object: to remove the King from danger and to bring the Rook into play. The conditions under which the move may be made are as follows: The King must not have moved; must not be in check; and must not pass, in making the move, over or on to any square attacked by any man of the enemy; the Rook must not have moved; and there must be no piece between the King and the Rook with which he castles.

Queen. The Queen, the most powerful of the pieces, can move in a straight line in any direction, forward, backward, sideways or diagonally over as many squares as are unoccupied. Thus, if she is in the middle of the board, and the way is clear, she commands 27 squares, as will be seen by trial.

Rook. The Rook, or Castle, which is next in power to the Queen, can move backward, forward, or sideways, but not diagonally, as many squares as the way is clear. He thus commands 14 squares, and is the only piece whose range is not lessened by being placed on a corner square.

Bishop. The Bishop can move diagonally forward or backward, but only on squares

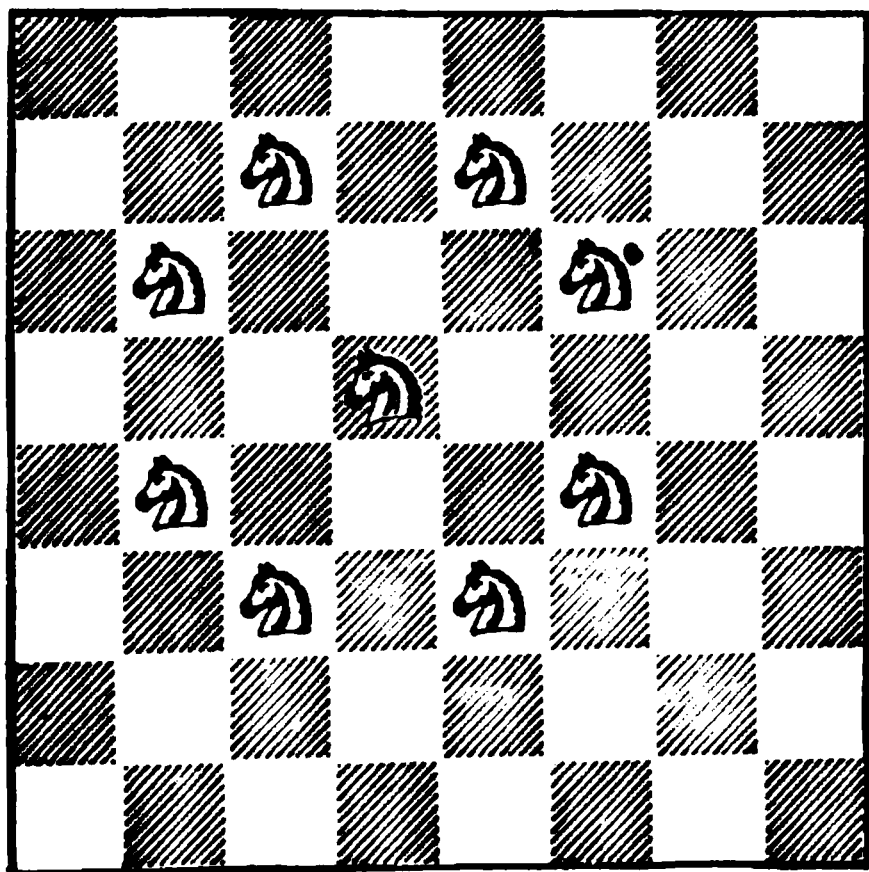


Fig. 3.—Moves of the Knight.

into check, and his owner can move no other man, there is said to be a "stalemate," and the game is considered drawn.

Once only, in the game, the King has the privilege of making, with one of the Rooks, under certain conditions, a double move called "castling." Castling may be performed on either the King's or the Queen's side of the board. If on the King's side, it is done by moving the King to K.Kt's square and then placing the King's Rook on K.B's square; if on the Queen's side, by moving the King to Q.B's square, and then placing the

of the same color on which he stood when the game began. One of a player's Bishops is therefore always on white squares, and the other always on black squares.

Knight. The Knight can move one square either backward, forward, or sideways, and then one diagonally. Thus the Knight in the middle of the diagram (Fig. 3), can move to any of the squares marked with a Knight. It is possible for the Knight to move thus in succession to every square of the board, occupying each square only once. This is called the Knight's Tour. One

way of performing it is shown in Fig. 4.

The Knight can move whether the squares he passes over are clear or not, and he is the only piece which can thus leap over another man when moving. When a Knight gives check therefore, it is useless for his opponent to move another piece between him and the King. The Knight is too the only piece which can be moved at the opening of the game, as it can leap over the Pawns which close the whole of the second rank. Unless the Knight can be captured, his check always forces the attacked King to move, as the Knight can leap over any blocking man.

ture. When a Pawn reaches the last square of the file on which it is moving, it is said to be "Queened," and receives the power and name of a Queen or of any other piece the owner chooses, except the King.

The player must at once notify his opponent as to whether the Pawn has become a Queen, Knight, Bishop, or Rook, as it sometimes happens that the making of a Knight would win a game which a Queen would only lose or draw. A player may, therefore, toward the end of a game, have two or more Queens, two Bishops on the same color, etc. A second Queen is often indicated by replacing the Queened Pawn by a Rook turned bottom upwards.

When two of the player's Pawns are on the same file, they are said to be "doubled," and when one stands alone, and unprotected by other Pawns, it is called an "Isolated Pawn." A Pawn which is obstructed by no hostile Pawn, either on the same file or on those to the right and left, is said to be a "Passed Pawn."

The Exchange. When a player by taking an opponent's piece exposes one of his own to capture, he is said to "make the exchange." In making exchanges the relative value of the pieces and Pawns must be carefully considered. Aside from the added values which certain positions give to the men as the game advances, the following rule gives the average value of each class of men:

The Queen is equal in value to two Rooks; to two Bishops and a Knight; to two Knights and a Bishop; or, nearly to eight Pawns.

A Rook is equal to a Bishop and one or two Pawns, or to a Knight and one or two Pawns.

Bishops and Knights are of nearly equal value; each is equal in value to three Pawns. The relative value of Bishops and Knights depends greatly on the more or less crowded condition of the board. When the lines are open the long stride of the Bishop gives him an advantage, but

Fig. 4.—Knight's Tour.

Pawn. The Pawn moves straight forward in the file on which it stands; its first move may be either one or two squares, but after that it moves only one square at a time. When a Pawn while being moved two squares passes over a square commanded by a hostile Pawn, the latter is not deprived of its privilege of capture and may take it just the same as if the Pawn had remained in the attacked square. This is called taking *en passant* (Fr., in passing). In capturing, the Pawn takes one step diagonally, to the right or the left, to the square occupied by the man taken, and after that continues on that file until it makes another cap-

in a close position, the leap of the Knight, together with the greater difficulty of calculating on his movements, increases his value beyond that of the Bishop.

The value of the Pawns is greatly increased as they approach the Queen row.

Drawn Games. It has already been explained that a stalemate is a drawn game. Other ways in which the game may be drawn will now be described.

1. When a player with an inferior force finds an opportunity to

BLACK.

WHITE.

Fig. 5.—White to play and mate in two moves.

give such a check that his opponent, either upon moving his King or interposing a piece, subjects himself to a continued series of checks, it is called "perpetual check."

2. Where there is not force enough to effect a mate.

3. Where one player has force enough to mate, but is not skillful enough to do so in the required fifty moves (see Rule 21).

4. Where both players continue to repeat the same series of moves through fear of each other.

The moves and general character

of the game have now been told, but it can be learned only by actual play.

It is advisable to castle early in the game, and on that side upon which the King can be best protected from attack. The King's side is usually adopted for the reason that there are fewer pieces on that side to get out of the way.

General Observations. The King becomes specially valuable when the other principal pieces have been taken. It is good play to check early in the game if by so doing castling is prevented, but it is bad play ever to check without an object. When a player's King is checked, he should interpose, if possible, some piece that attacks the checking piece, but never one of greater value.

The Queen being the most valuable of the pieces, care must be taken that she is not placed on an open file or diagonal in line with the King, permitting the enemy to pin her with a Bishop or Rook. The Queen not being able to move from the line, since the King would be left in check, has to exchange. This is called "losing the exchange." The same term is used also when a Rook is exchanged for a Bishop or Knight.

The Rook can do little at the opening of the game, but later, especially after the

Queens have been exchanged, it is a very important piece.

The Bishop is of especial value in attacking a Knight or Rook. The King's Bishop being of special value by reason of his power of attacking the opposing King at the beginning of the game, should, if possible, be retained, whilst it would be well to endeavor to exchange a Queen's Bishop for the opponent's King's Bishop.

The Knight should not be allowed to get to the side of the board, as his power is much lessened there. The

Knight often opens the game, and a skillful player can make him a very powerful piece.

In playing the Pawns the player should try to obstruct the way of the enemy and keep his own clear. The Pawns united have great power, but separated very little. The player who has Pawns at the end of a game, while his enemy has none, generally wins. The most important parts of a game are the beginning and ending, and a few special cases of these will be described.

The following are illustrations of the use of the names and abbreviations, and also of the check and checkmate :

First : Suppose the men to be as in Fig. 5.

If it be White's turn to play he can mate in two moves, as follows :

- | WHITE. | BLACK. |
|----------------|------------------------|
| 1. Q.—K.R. sq. | 1. Either R.×R. |
| 2. Q.×R. mate. | |
| or | |
| 1. Q.—K.R. sq. | 1. R. moves elsewhere. |
| 2. R.×R. mate. | |

White plays for his best move—1, Q.—K.R. sq. Now, if Black with one of his Rooks takes one of the white Rooks, White plays 2, Q.×R., and can now say "check," for his Queen commands the square on which the black King is, and would take him, were he any other piece. The black King having now no piece which can be interposed, and two of the three adjacent squares being occupied by his own pieces and the third being likewise attacked by the hostile Queen, the King is checkmated. If, instead of moving a Rook to the end of square, Black plays one of his Rooks but one, two, or even five squares, then one of the white Rooks captures it and mate is given in the same manner. It is evident that the black Pawn cannot be moved, because the King would then be in check of the white Queen.

An example of Perpetual Check is

shown in Fig. 6, called the Treadmill :

- | WHITE. | BLACK. |
|----------------------------|------------------------|
| 1. Kt. to B. 3 + | P. takes Kt. (forced). |
| 2. B. to B. 5 dis. + | K. to K. 4 |
| 3. R. fr Q. sq. takes B. + | R. takes R. |
| 4. R.—K. 6 + | K.—Q. 5 |
| 5. R.—K. 4 + | K.—B. 4 |
| 6. R.—B. 4 + | K.—Q. 3 |
| 7. R.—B. 6 + | K.—K. 4 |
| 8. R.—K. 6 etc. | |

and draws by Perpetual Check, the Rook going round like a wheel, while the King steps from one rung of the ladder to the other.

GAME FOR PRACTICE.

The beginner who has no experi-

BLACK.

WHITE.

Fig. 6.—The Treadmill.

enced player for a teacher will learn much about the moves and the different situations by playing, on the board, the following practice game, making each move slowly and carefully, and trying thoroughly to understand the reasons given for it.

The game, with the comments on the different moves, is from the treatise on Chess by Howard Staunton.

- | WHITE. | BLACK. |
|------------------|------------------|
| 1. P. to K. 4. | 1. P. to K. 4. |
| 2. B. to Q.B. 4. | 2. B. to Q.B. 4. |

This constitutes the King's Bishop's opening (see following).

3. Q. to K.R. 5.

This threatens to checkmate Black by taking the K.B. Pawn with the Queen, and also threatens K.'s Pawn, but it is rarely right to play the Queen so soon. Black easily protects himself by the following move :

3. Q. to Q. 2.

4. Kt. to K.B. 3. 4. P. to Q. 3.

Here, White attacks Black's K. Pawn again, but Black again defends it by bringing up another man.

5. Kt. to K.Kt. 5.

This brings three pieces to attack Black's K.B.P., which is defended by only two.

5. Kt. to K.R. 3.

Black here defends by bringing up a third piece. A skillful player would probably make instead an attack in another place, for instance by threatening White's Queen with Kt. to K. B. 3.

6. Kt. to Q.B. 3.

This move threatens to attack the Queen at Q. 5.

6. P. to Q.B. 3.

Black guards against the attack.

7. Castles.

7. Castles.

(Moving the K. to K.Kt.'s sq. and the R. to K.B.'s sq.) (In the same way.)

As a rule, beginners should castle early in the game.

8. P. to Q.'s 3. 8. Kt. to Q. 2.

Black acts wisely here in not attacking the Queen at once by playing Q.B. to K.Kt. 5.

9. K. to K.R. sq.

The object of this move is to strengthen White's attack on the opposite King. He wishes to throw forward his K.B. Pawn, but while the King stands on Kt.'s sq. moving the Pawn would expose the King to check from the opposing Bishop. Therefore, he moves his King as above.

9. Kt. to K.B. 3.

This forces White to move his Queen, and makes Black's King secure, for a time.

10. Q. to K.R. 4. 10. P. to Q. 4.

Very well played, for if White does not take this Pawn with Pawn his Bishop is driven back ; while, if he does take it, he gives Black a chance to attack the white Queen with K.Kt.

11. P. takes Q.P. 11. Kt. to K. B. 4.

This forces White to move his Queen, and there is but one square to which he can move her, all the others being attacked.

12. Q. to K.R. 3. 12. Kt. to K. 6.

Black thus attacks at the same time White's Q. with his B., and R. with his Kt.

13. Q. to K.R. 4.

Instead of this he might have moved his foremost Pawn to Q.'s 6th, threatening the black Queen, but the Queen might then have retreated to her own square, where she would be safe.

13. Kt. takes R.

14. Q.Kt. to K.'s 4.

Black exposes his Kt. to capture (see move 17), and White therefore simply exchanges his Rook for his enemy's Knight. This is called "the exchange." White loses the exchange in this instance because a Rook ranks above a Knight. But in return for this loss he is enabled to attack the black King again.

14. P. to K.R. 3.

If Black had taken Kt. with Kt., White would have checkmated by taking K.R.P. with Q. If he had taken Q.P. with P., White would have checkmated in two moves by taking Kt. with Kt., checking, and then K.R.P. with Q., checkmating.

15. P. to Q. 6.

White defends himself by keeping up the attack. This is better than to move back the threatened Knight.

15. B. takes P. at Q. 6.

If Black had taken the Knight with Pawn instead, he would have lost the game. White would have taken P. with his Q.'s B., and checkmate would follow, as the learner can discover in a few minutes' study.

16. Kt. to K.B. 3. 16. Kt. takes Kt.

17. Q. takes Kt. 17. K. to R.'s sq.

18. K. to Kt.'s sq.

White loses time here. His object is to take the Knight, but the Knight cannot escape and it would have been better to try to prevent the advance of Black's K.B. Pawn.

18. P. to K.B. 4.

19. Q. to K. 2.

It would have been better to play Q. to K.R. 4, for now Black is likely either to release his Knight, or gain another piece in return for him.

19. P. to K. 5.

20. Kt. to K.Kt.'s 5.

If Black should now try to take the Knight, he would lose the game.

20. Kt. takes K.R.P.

Black has now contrived to free the Knight.

21. P. takes P. 21. P. takes P.

22. Q. to K.R. 5.

Having lost a Rook, White cannot afford to take the Pawn with his Queen and exchange Queens. He prefers to try and gain a Rook for his Knight.

22. Kt. to K.Kt. 5.

Black does not attempt to prevent him.

23. Q. to K.Kt. 6.

White had better have checked with his Kt. at K.B. 7, as he intended.

23. B. to K.B. 4.

Black might safely have taken the Kt. with his K.R.P.

24. Q. to K. R. 5.

White could have gained the Rook for his Knight by giving check with the Knight, but then he would have had to exchange Queens, and a Queen would be a greater loss to him than to Black, since White's force is smaller.

24. P. to K.Kt. 3.

This prevents White from exchanging the Knight for the Rook, and he retires.

25. Q. to K.R. 4. 25. B. to Q.B. 4.

The Black threatens to take White's Q. by first taking K.B.P., and to prevent it White must move his Queen or interpose his Q. Bishop.

26. B. to K. 3.

This costs White two pieces for one (see next three moves), but the other course would have been as bad.

26. B. takes B.

27. P. takes B. 27. Q. takes Kt.

White can now be beaten by any experienced chess player.

28. Q. to K.'s sq.

28. Kt. takes P.

29. Q. to Q.B. 3 (ch.)

29. K. to R. 2.

30. Q. to Q. 2.

30. Q.R. to Q.'s sq.

31. Q. to K. 2.

31. B. to K.Kt. 5.

32. Q. to K.'s sq.

32. Kt. takes K.Kt.'s P.

33. K. takes Kt.

33. B. to K.R. 6.

Black thus gives a double check.

34. K. takes B.

34. R. to B. 6 (ch.)

35. K. to R. 2.

35. Q. to R. 4 (ch.)

36. K. to Kt. 2.

36. Q. to Kt. 5 (ch.)

37. K. to R. 2.

37. R. to R. 6.

Checkmate.

Black thus wins the game in 37 moves.

OPENINGS OF GAMES.

Some of the different ways of beginning the game have received special names, and a few of these will now be given. It will be noted that in most of them the King's Pawn is moved first. This is because it clears the way not only for the King, but for the Queen and the King's Bishop.

The Knight's Opening.

WHITE.

BLACK.

1. P. to K. 4

P. to K. 4.

2. Kt. to K.B. 3.

The King's Bishop's Opening.

1. P. to K. 4.

P. to K. 4.

2. B. to Q.B. 4.

The Queen's Bishop's Pawn's Opening.

1. P. to K. 4.

P. to K. 4

2. P. to Q.B. 3

The King's Gambit.

1. P. to K. 4.

P. to K. 4.

2. P. to K.B. 4.

P. takes P.

The word Gambit is derived from an Italian term used in wrestling, meaning a tripping up. In the above opening, and similar ones, a Pawn is placed where it may be taken, so that the player losing the Pawn will, by reason of the loss of time caused to his opponent, be able to bring his strong pieces into position and will regain the Pawn, perhaps with interest, at a later stage of the game.

If the opponent take the offered Pawn, that constitutes the Gambit, but he often refuses so to do. There are many Gambits, known generally by the names of the players who devised them. The King's Gambit, given above, is considered one of the safest openings for beginners. There are numerous variations of all these different openings, and numerous methods of defense. For instance, in the Knight's opening, Black may make any of the following for his

BLACK.

WHITE.

Fig. 7.—White to play and mate in four moves.

second move. Each has been favored by skilled players.

Q.Kt. to Q.B. 3.

P. to Q. 3.

K.Kt. to B. 3.

or Q.Kt. to B. 3.

If this last move is followed by

WHITE.

BLACK.

3. B. to Q.B. 4. 3. B. to Q.B. 4.

the opening is called the *Gioco Piano* (Italian for Plain Game).

ENDINGS OF GAMES

A game may end in various ways. If a player have a Queen and King against a King, he should win easily. With a Rook and King against a King, he should win in not more

than 20 moves. With a King, Bishop, and Knight only against a King the game can be won also, but it requires some skill to do it, and the checkmate can be given only in a corner of the color on which the Bishop is running. With a King and one or two Knights only, or with a King and one Bishop only, checkmate cannot be given, and the game is drawn. The method in each case is to drive the opposing King to the edge of the board. With a King and two Bishops against a King this is much harder to do, but it can be done in about 30 moves. He who desires to become a skillful player should study the different cases that occur at the end of a game, examples of which can be found in any handbook or treatise on Chess.

PLAYING WITH ODDS.

In a game between a skilled player and a beginner, the former often gives the latter odds, that is, does, or agrees to do, something to his own disadvantage so that the contest may be more nearly even. Sometimes he plays with a "Ringed Pawn," that is, he marks one of his Pawns by putting a ring over it, or in some other way, and agrees to checkmate with that particular Pawn. If he cannot do so, he loses the game. Sometimes the experienced player "gives the Pawn and move," that is, he takes his King's Bishop's Pawn from the board, and allows his opponent to move first. In like manner he sometimes gives Pawn and two moves, two Pawns and a move, a piece and one or more moves, or any of these without the move (see Rule 5).

CHESS PROBLEMS.

Chess Problems consist of certain arrangements of pieces, with which it is required to checkmate in a given number of moves. The study

of these problems is a great aid to the Chess player, and books have been published which contain nothing else. To show what they are like three problems are given below. The learner should try hard to solve them before looking at the answers.

First Problem (Fig. 7).

1. White. K. to Q.B. 5.

It will be seen by a little study that the only piece Black can move is his King, and the only move the King can make without going into check is K. to K. 5.

2. White now moves B. to K.Kt. 2 (check).

Black's only move is K. to K. 4 (retiring to his former post).

3. R. to Q.B. 2. P. takes R. (Black's only move.)

4. White moves Queen's Pawn two squares (as he is allowed to do, since it has not yet moved), and checkmates.

Second Problem (Fig. 8).

White. Q. — Q.B. 8. Now if Black moves his Queen or the Knight at Q.R. 4. to Q.B. 5, White plays his Knight to Queen's sq., checkmating, because the black piece just played blocks the square previously guarded by the Knight.

If Black move the Knight at K. 4 anywhere, he leaves the Pawn at Q. 6 unguarded and White plays 2. R. takes P., mate. If Black move his Queen in any other way than to Q. B. 5, or if he move his Bishop anywhere, then White plays the Kt. at B. 7 to Q. 5., or Q.Kt. 5, giving checkmate, as the Kt. cannot be taken on account of discovering a check from the Queen.

Third Problem (Fig. 9). The following ingenious position, by the great chess master Petroff, aptly illustrates the moves of the Knight in a crowded board. The disastrous retreat of Napoleon (the Black King)

from Moscow, in 1812, the harassing of his troops by the Cossack cavalry (the white Knights), the crossing of the river Berezina (the white diagonal running from K.R. sq. to Q.R. 8), and the final blow delivered by the Russian emperor in person, are graphically depicted. The White K.R.'s sq., K.R. 8 sq., and Q.R. sq., represent St. Petersburg, Paris, and Moscow respectively.

126 3 BLACK.

WHITE.

Fig. 8.—White to play and mate in two moves.

SOLUTION.

WHITE.	BLACK.
1 Kt. to Q. 2, giving double check and forcing the Black K. to go to his Rook's 4.	
2 Kt. to B. 3 +	K. to R. 6.
3 Kt. from Q. 2 to Kt. sq. +	K. to Kt. 5.
4 Kt. to R. 2 +	K. to Kt. 4.
5 Kt. to R. 3 +	K. to R. 3.
6 Kt. to Kt. 4 +	K. to R. 2.
7 Kt. to Kt. 5 +	K. to Kt. sq.
8 Kt. to R. 6 +	K. to B. sq.
9 Kt. to R. 7 +	K. to Q. 2.
10 Kt. to Kt. 8 +	K. to K. 2.
11 Kt. to B. 8 +	K. to B. sq.
12 Kt. to Q. 7 +	K. to Kt. sq.
13 Kt. to K. 7 +	K. to R. sq.
14 K.Kt. 3, discovering check and mate.	

RULES OF THE GAME.

The following rules, in substance, are used by all Chess players in the United States, being condensed from those adopted by the Fifth American Chess Congress.

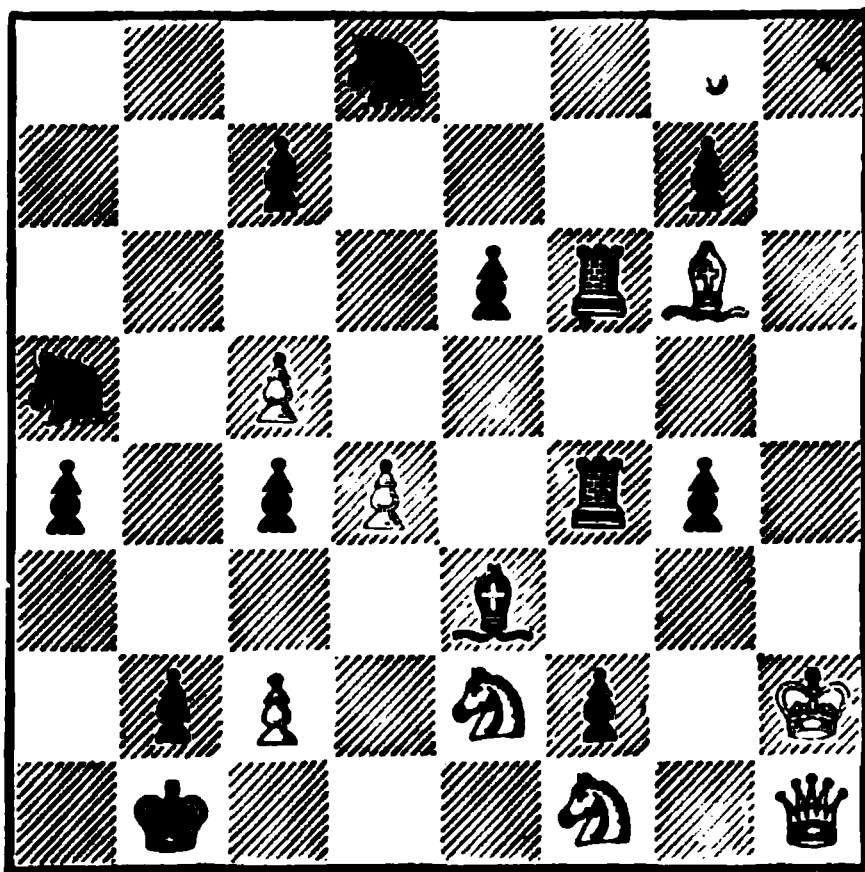
1. The Chess board must be so placed that each player has a white corner square nearest his right hand.

2. A deficiency in number, or a misplacement of the men, at the beginning of the game, when discovered, annuls the game.

3. If a player, undertaking to give odds of a Piece or Pawn, neglect to remove it from the board, his adversary, after four moves, has the choice of going on with the game, or beginning it again.

4. When no odds are given, the players must take the first move of

BLACK.



WHITE.

Fig. 9.—Retreat of Napoleon.

each game alternately, drawing lots to see who shall begin the first game.

5. The player who gives the odds has the right to move first, unless otherwise agreed. Whenever a Pawn is given it must be the King's Bishop's Pawn.

6. A Piece or Pawn touched must be played, unless, a man not being in proper position, the player, before touching it, gives notice of his intention to arrange it by uttering distinctly the words "J'adoube" (I replace). But a Piece or Pawn overturned or displaced accidentally may always be touched to put it back.

When the player's hand has once quitted the piece moved, the move must stand.

7. While a player holds the Piece or Pawn he has touched, he may play it to any square to which it may legally move.

8. Should a player touch one of his opponent's men without giving notice that he is only arranging it, he must take it, if he can, and if not, he must move his King; but if he can do neither, then there is no penalty.

9. If a player touch more than one of his own men, he must move either one that his opponent may name.

10. If a player take one of his adversary's men by making a false move, his opponent may compel him to take it with a man which can legally take it; or, to move his King.

11. Should a player take one of his own men with another, his adversary may compel him to move either.

12. If a man be played to a square to which it cannot legally be moved, the player's adversary may require him to move the man legally, or to move his King.

13. If a player make two moves in succession, the adversary may take his choice as to which one shall stand.

14. Penalties can be enforced only at the time an offense is committed, and before any move is made thereafter.

15. A player cannot castle—(1) if the King or Rook have been moved, (2) if the King be in check, (3) if there be any piece between the King and the Rook, (4) if the King pass over any square attacked by the adversary. For attempting to castle illegally, the player doing so must move either the King or Rook, as his adversary may dictate.

16. If a player touch a Piece or Pawn that cannot be moved without

leaving the King in check, he must replace the Piece or Pawn and move his King, but if the King cannot be moved, no penalty can be inflicted.

17. No penalty can be enforced for any offense committed against these rules in consequence of a false announcement of "check," nor in consequence of the omission of such announcement, when legal "check" be given.

18. If the King has been in check for several moves, and it cannot be found how it happened, the player whose King is in check must take back his last move, and free the King from check; but if the moves made after the check are known they must all be taken back.

19. A willful displacement or overturning of the men forfeits the game.

20. Every Pawn which has reached the last line of squares must be immediately exchanged for a Queen, or any other piece the owner may choose, except a King, even though all the pieces remain on the board.

21. If a player remain at the end of the game with a Rook and Bishop against a Rook, with both Bishops only or with the Knight and Bishop only, or if it be doubted near the end of a game, whether it will be a win or draw, or a win be possible, but the skill to force the game questionable, then either player may demand that the fifty following moves be counted. If, at the end of these fifty moves on each side, no checkmate has been given, the game is drawn.

22. If a player agree to checkmate with a particular Piece or Pawn, or on a particular square, or engage to force his adversary to stalemate or checkmate him, he is not restricted to any number of moves.

Give-away Chess. A form of the game which has recently come into use. Not requiring so much deep thought, and being full of sudden and unlooked-for surprises, it offers a quiet relaxation after the tiring headwork of a game of regular Chess.

The Give-away game differs from the ordinary one in this, that a player must invariably take a man when offered. When two or more men can be taken, the player has a choice, except when the King is in check; in such case the checking piece must be taken, and in any event the King must be gotten out of check. The game is won in two ways. When a player is unable to force his antagonist to mate him, or gives him "suicide," as it is called. Secondly, when he forces his antagonist to capture all his men, leaving his King alone on the board.

A good player strives to get rid of his Pawns as rapidly as possible.

Fifteen or twenty moves may be easily calculated ahead in this game on account of the large number of forced moves.

It differs greatly from the Give-away game in CHECKERS, because in the latter game he who has, at the end of the game, the superiority of force can win, whereas in the corresponding Chess game it is not possible to say whether it is best to hold a lesser or greater number of pieces than your antagonist.

Four-handed Chess. This game is now played in all the principal clubs on both sides of the Atlantic.

It is played on a board which may be described as an ordinary Chess board taken for a center, to which is added four other boards, placed one on each side. These added boards are but three squares deep, that is, they have each 24 squares. The whole has, therefore, 160 squares.

A player sits at each of the sides of the board, the two players facing each other playing as partners, and the move changes from the player who has just moved, to his opponent on the left. Two sets of men are used, the one black and white and the other red and blue, the red and black being used by one pair of partners, and the blue and white by the other pair. The men are set in

the same manner as in the two-handed game, with the exception that the Kings are placed upon the right of the Queens, and the men are moved as in the ordinary game. No international code has, as yet, been adopted for this variety of the game, although several books upon the sub-

ject have been published in England and Germany. The rules here given are those in use in New York, and differ but slightly from those of Europe.

RULES OF THE GAME.

1. Before beginning a game an agreement must be arrived at as to

BLUE.

BLACK.

WHITE.

Four-handed Chess Board.

whether the games shall be consultation ones or not. If not, then perfect silence regarding the play must be maintained between the partners under penalty of the loss of the game.

2. The men are placed in the two first rows of the four wings of the board in the same manner as in

ordinary Chess, except that the Kings must all be placed on the right of Queens; the Kings, therefore, do not face each other as in the regular game.

3. The three rows of the wings form the territories of the four Kings, and the 64 squares of the main

board forms the neutral or fighting ground.

4. The Pawns may be moved one or two squares on the first move of each, afterwards but one. A Pawn having reached the other side of the board, remains blocked. [In Europe the rule is that the Pawn changes direction upon reaching the fourteenth rank. The question, however, is of very little importance, since the chance of a Pawn in the four-handed game reaching the other side of the board is not one in a thousand.]

4. A Pawn having pushed against another Pawn or piece, no matter to whom it belongs, cannot move until the obstacle is removed, or a man should be, or come upon, the contiguous diagonal so that it may be taken by it.

5. Pawns are Queened only upon the King row of one of the enemies' territories. These squares can only be reached by the Pawns moving diagonally when capturing the enemy's men. As soon as a Pawn reaches one of the three ranks of the enemy's territory, it changes its direction of motion and moves toward the King row of the territory just reached. At the same time it receives a great increase in power, for it can capture a man on any of the four contiguous diagonals. If, however, by reason of taking a man it returns to its own territory, or to the neutral ground, then it loses its added force and takes up its original direction. This change of the force and direction of the Pawn causes no confusion, as its position proclaims its power.

6. The game is won only when both the opposing Kings are checkmated.

7. When one of the Kings has been checkmated, his pieces are dead for the time being, and none of them can be captured or the squares upon which they stand be occupied by a man, either friend or foe.

8. A King is not officially in check until his turn comes to move.

9. A King is not mated until his turn comes to move, when, if in check and unable to get out of it, he is checkmated.

10. A partner is not required to cover a check to his partner's King, nor is he prevented (interdicted) from moving one of his pieces and thereby uncovering a check upon his partner.

11. A checkmate having been released by one partner removing a piece, or otherwise, the other partner having to move also before the checkmated King, cannot take one of the latter's pieces, as the checkmate is not officially annulled until the mated King's turn comes to move.

12. Castling is permitted in this game, but cannot be made use of until the game is far advanced.

13. When one of your antagonists is checkmated, his men being dead, your King may move to and remain upon any square commanded by the dead pieces. The moment, however, the mate is released, your King comes into check and must be gotten out when your turn comes to move. This rule does not apply to Kings, which cannot be brought into close proximity at any time.

Method of Play. If great care be not taken in the opening, mate will be given on the third or fourth move. The opening move generally adopted is Pawn to Q.B. 3 for the first three players, and P. to K. 3 by the fourth player. This move of P. to Q.B. 3 is made in preference to the old move of 1, P. to K. 3, because it is at once defensive and attacking. The fourth player is compelled to play 1, P. to K. 3, to prevent getting into trouble.

A check in this game is much more to be feared than in an ordinary game, for the reason that the partner of the man who gives the check seizes the opportunity to inflict all the damage he can upon the one who is in trouble. The great aim, therefore, of a player of this

game, is to endeavor to have a check threatened against one or both of his opponents' Kings and keep his own King so covered up that his opponents cannot give him check. Unlike the ordinary two-handed game, the Queens are brought out in the early part of the game because their power of giving check is very great. Before making a move, the partner's position must be carefully examined as well as the player's own, and if he see that the former is in greater straits than himself he is called upon to sacrifice himself and aid his friend. Ability and promptness in doing this is considered one of the great virtues in Four-handed Chess.

The King's Rook's Pawn moved two squares is a strong defensive move and is frequently made as a second or third move.

A double check by each of the opponents must be carefully avoided, as the result is often a mate.

The order of succession of the moves must be carefully considered, as a failure to observe which of the opponents will first move will spoil a player's calculations and result in disaster.

History. The origin of Chess has been claimed by many nations and ascribed to various persons. Some writers say that it was invented by Japhet, the son of Noah; others by King Solomon, the Greek Palamedes, Han-sing, a Chinese Mandarin, Shat-reuscha, a Persian astronomer, etc. But these stories are purely imaginary.

Thanks to the recent researches of Dr. Forbes, all doubts have been set at rest, and the best modern writers concur in the belief that the game is of Hindoo origin. Dr. Forbes has discovered in Hindoo literature documents dating back to 3000 years B.C., describing a game which certainly represents, in a primitive form, the modern game of Chess. It was called Chaturanga, which means Four Parts, because it was played by four persons. The

board had 64 squares, as now, but all of the same color. Each player had four Pawns and four Pieces—King, Elephant, Horse, and Ship, corresponding to our King, Bishop, Knight, and Rook. The moves were at first determined by throwing DICE, but afterward the player moved which he pleased. The King, Horse, Ship, and Pawns moved like our King, Knight, Rook, and Pawns, but the Elephant (our Bishop), could advance only two squares at a time. The Hindoos took the game

One of Charlemagne's Chessmen.

to Persia, where the name was corrupted to Shatranj, and from that country it spread to Arabia, and thence to Europe, being probably taken first to Spain by the Moors. But before the game left India the number of players was reduced to two, each with a double set of men as at present. Instead of having two Kings, however, one of them was reduced to a mere counselor or general (our Queen), who was allowed to move only one square diagonally. During the Middle Ages, but at what times is not known, the powers of the Bishop and Queen were increased,

the Pawns were allowed to jump two squares at the first move, and castling was introduced.

The names of the Chessmen vary in different countries, though the principal piece is everywhere called

Ancient Chess Kings.

the King, and the second, Queen or Lady. The latter, as has been said, was originally a minister or general, called in Persian *Fars* or *Firs*,

Modern Chessmen.

which in Europe became *Farsia* or *Fercia*. Some say that in France this was corrupted into *Vierge* (Virgin), and thus the piece came to

be called *Dame* (Lady). The Persian *Pil* (Elephant) became in Arabic *Al-Fil*, and in Spanish *Alferes*. The French *Fou* (fool) is corrupted from the same word. The German



Ancient Chessmen.

name is *Laufes* (runner), and the pieces are called Bishops in no language but English. The Hindoo *Roka* (ship) becomes our Rook and the Italian *Rocca*. The latter word

means a rock or fortress, so the piece is called also Castle in English, *Tour* (tower) in French, and *Thurm* (tower) in German, and is made to look like a Tower. The Cavalry piece, which was a Horse in India, has become a Knight in English and *Cavalier* in French, though it is still made like a Horse's head. The Germans call it *Springer* (leaper). The Pawn was first called Foot Soldier, in French *Pion*, whence our Pawn. The Germans call the Pawns *Bauern* (peasants).

The game itself is called in French

Game of Chess with Living Chessmen. (See page 188.)

Echecs, and in German *Schach*, which, with our word Chess, are probably all from the Persian *Shah*, King, though some say they are from the old Hindoo name of the game, Chaturanga. The word checkmate is probably from the Persian *Shah-mat* (the King is dead).

From its earliest history Chess has been a favorite game with great men. Timur or Tamerlane, the Tartar conqueror, invented what he called the "Great Game," on a board of 110 squares, and invited the principal men to play with him in every town

he entered, sending them away with presents, whether he lost or won. The Caliph Haroun Al Raschid, sent to Charlemagne a fine set of Chessmen, one of which is shown in the illustration. The game was a favorite also with Voltaire, Napoleon, Frederick the Great, and many other celebrated persons.

Chess is said to be the only game now considered harmless by all religious sects, but in the Middle Ages it was often condemned with other games by the rulers of the church. In the countries most remote from

European influence it is still played in the old way, with the original Hindoo or Persian moves; but in most parts of the world it is played

The Automaton Chess Player. (See page 188.)

as with us. A great many books have been written about it, one of the first of which was by Abul Abbas, a physician of Bagdad, in the year 899. The first to bring Chess into public notice in this country was Benjamin Franklin, who also wrote an essay on "The Morals of Chess." The game was little played here, however, before 1825. In 1858 Paul Morphy, an American, was Chess champion of the world, and he is considered by some the finest player that ever lived.

The forms of Chessmen have varied from time to time. The Persians and Arabs, and other Mohammedan peoples, being forbidden by their religion to have images of any kind, usually made their pieces in rude shapes, though sometimes with an approach to a figure. In Christian Europe, they assumed many shapes, some of which are shown in the pictures. The last figures on page 185 show examples of modern Chessmen.

Circular Chess Board.

In the Middle Ages the game was sometimes played by monarchs with living Chessmen in a court yard paved to represent a Chess board, as shown on page 186. A circular chess-board was sometimes used in old times. The numbers in the illustration correspond to the following names: 1, King; 2, Queen; 3, Rock (Rook); 4, Alfin (Bishop); 5, Knight; 6, Pawn.

A so-called Automaton Chess Player was first exhibited in Vienna, in 1769, by Wolfgang von Kempelen, an Austrian mechanician, and it was bought about 1805 by John Maelzel, who brought it to this country. It consisted of a figure of a Turk seated behind a box which, when opened, appeared to be nearly full of machinery that was supposed to move the figure, but it was afterward discovered that a man ingeniously concealed in the box was the real player. The man could tell what pieces were moved by means of little magnets under the board, which rose or fell as the squares were occupied or not, the Chessmen containing pieces of iron. In 1842 the automaton was bought by a gentleman in Philadelphia, and in 1854 it was destroyed by fire in that city, but several imitations of it have since been exhibited, in which the figure was called by various names, such as "Mephisto" and "Ajeeb." It is of course impossible to make a mere machine which will play a game like Chess.

CHIVALRY, a game played by two persons on a board like that in the figure. The squares are alternately light and dark, and the letters, spots, and stars are gilt. Each player has twelve pieces like Pawns in CHESS and eight others, slightly different, called Knights. Each places his common pieces on the two rows of spots nearest him, and his Knights on the squares marked K., and the players take turns in moving, the object being to occupy the two opposite gold stars with any two

pieces. Both Knights and men have three kinds of moves.

1. The common move, by which the piece advances one square in any direction, like the King in CHESS.

2. The canter, by which a piece leaps a friendly piece to the next space beyond in any direction, provided that space is vacant. The leaped piece remains on the board. The same piece can make as many canters as it wishes in one move, but is not obliged to canter at all.

3. The jump, by which a piece leaps an enemy's piece in any direction, provided there is a vacant space just beyond. The jumped piece is removed from the board. The jump

Chivalry Board.

must be made, if there is a chance, and as many as possible must be made by the same piece in one move.

The plain pieces can move, canter, or jump, but can never combine two of these methods in one play. The Knights can combine the canter and jump, provided that all canters precede all jumps, but cannot combine a simple move with either of the others. The game differs from CHECKERS in allowing a piece to pass over one on the same side. It is entirely a game of skill.

CHLORATE OF POTASH, Experiment with. Melt a teaspoonful of chlorate of potash in a test-tube,

and when it begins to boil drop into it a bit of charcoal the size of a pea. The charcoal will take fire and jump about in the tube. The reason is that heating the chlorate of potash sets free the OXYGEN in it, and it is this that causes the charcoal to burn so vividly.

CHLORINE, Experiments with. Chlorine gas is described in C. C. T. The easiest way to make it is to put a few teaspoonfuls of chloride of lime in the bottom of a glass jar, and pour on it just enough dilute sulphuric acid to cover it. Chlorine will at once begin to be formed, and owing to its weight will remain in the jar if a piece of paper be placed over the mouth to prevent draughts. The experimenter must avoid breathing the gas, as it is very irritating to the lungs. If it be desired to keep the jar clean, the chloride of lime may be put into a small wide-mouthed bottle, like a vaseline bottle, which is lowered into the jar by a string tied around the neck, and the sulphuric acid is then poured into the small bottle by means of a funnel. When enough gas has been made to fill the jar, the little bottle is withdrawn by means of the string. The chlorine, made in this way, comes from the chloride of lime. Chlorine may be prepared in several other ways, but the one just given is the simplest. In making and experimenting with this gas, it is best to stand in a draught, so that what escapes may be carried away from the experimenter.

EXPERIMENTS.

1. One-third fill a small jar of chlorine with water; then place the hand tightly over the mouth of the jar and shake the contents a few minutes. It will be found that the hand sticks to the jar, as if the air had been partially pumped out by an air pump (C. C. T.). The reason of this is that water dissolves chlorine easily and thus makes the pressure in the jar less than that of the air without.

Note. Owing to the attraction of

chlorine for water it often gets laden with moisture, and to insure the success of some of the following experiments, the gas may have to be dried. This may be done by shaking in the jar several bits of pumice stone wet with strong sulphuric acid.

2. It will be found impossible to burn a jet of chlorine in the air, but it may be burned in hydrogen, using the apparatus described in the article OXYGEN, for burning oxygen in hydrogen.

3. Lower a burning candle, or a lighted wood-splinter, into a jar of chlorine. It will continue to burn, but will give off a dense black smoke. The reason is that chlorine likes hydrogen but not carbon (see C. C. T.). Candles and wood contain both these elements, so the chlorine unites with the hydrogen and throws off the carbon in a cloud of black particles.

4. Dip in oil of turpentine a bit of cotton fastened to the end of a piece of wire. Heat it by holding it over a stove for a moment, and then plunge it into a jar of chlorine. If it has been warmed enough it will take fire, burning with a dense black smoke.

5. *To bleach with chlorine.* Hang in a jar of chlorine a bit of colored cloth, or a flower, and the color will be taken out. Ink spots can be removed from cloth or paper in the same way. It is necessary that either the chlorine or the article to be bleached be slightly moist, as dry chlorine will not bleach. A solution of the gas, called chlorine water, may be prepared as in experiment 1, and can be used for bleaching or as a disinfectant. Pour some on any ill-smelling or colored substance, and in most cases the bad odor, or the color, will disappear.

6. Into a jar of chlorine sprinkle powdered antimony. It will take fire as it enters the gas.

CHOOSING SIDES, or Choosing Up. In many games where the players are divided into two

opposite parties, some way of choosing sides is necessary. In most cases two captains are first agreed upon. The captains decide which shall have first choice, and then, in turn, choose the other players, one by one. As soon as a player is chosen he stands near his captain. The first choice is determined by lot, and there are many ways of deciding it, some of which are given below.

I. By drawing cuts. One captain holds in his hand a long and a short piece of paper or wood, of which he shows only the ends. The other draws one of them, and the player holding the short piece has first choice.

II. By throwing up a coin. One captain throws a coin into the air while the other cries either "head" or "tail." If the side of the coin which he mentions comes uppermost, he has first choice; otherwise, the tosser has it. The side with the date on is always considered the head; the other the tail.

III. In games played with a racket, the racket is used as the coin is above, except that the cries are "rough" and "smooth," corresponding to the rough and smooth sides of the racket.

IV. In games played with a bat or

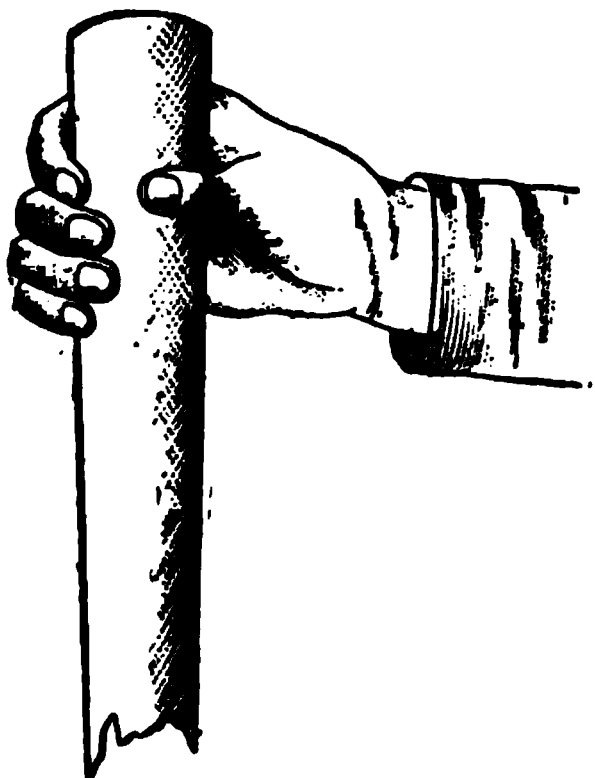


Fig. 1.—Choosing Sides.

stick of any kind, like baseball or hockey, the first choice is often decided thus: One of the captains, A, holds the bat upright, and throws it to the other B, who catches it in one hand, also holding it upright. A then grasps the bat in one hand above where B is holding it and as close to B's hand as possible. B then lets go and grasps the bat above A's hand in like manner. Thus they go on in turn, and the one who holds the bat nearest its end (as in Fig. 1, without letting his hand reach beyond it), has first choice. A hand is judged to be below the end of the bat when a stick laid across that end,

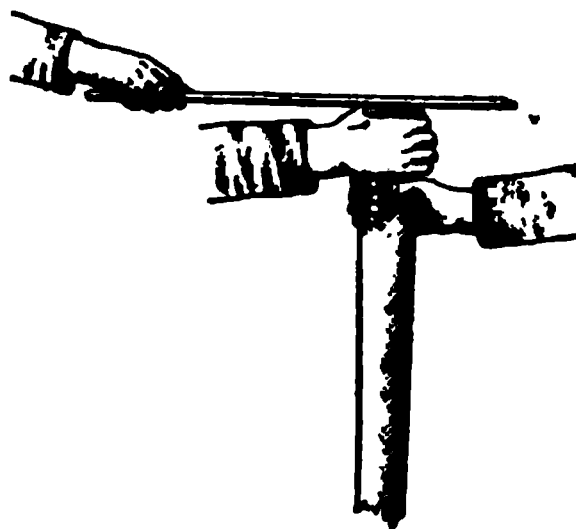


Fig. 2.—Choosing Sides.

as in Fig. 2, does not touch the hand.

V. A number of playing cards equal to that of the players, half red and half black, may be shuffled and then dealt one to each. The holders of black cards play on one side, and those of red cards on the other.

VI. One of the captains shuts his eyes or turns his back on the other, who holds up as many fingers as he chooses and says "Odd or even?" If the first named captain answer correctly, he has the first choice; if not, the other has it.

CHRISTMAS SPORTS. Christmas Day, the 25th of December, is celebrated throughout the Christian world by the giving of presents in different ways, which will be described separately.

Christmas Trees. The present are hung on an evergreen tree, which

is decorated and lighted with candles. The best Christmas trees are of spruce, but hemlock, cedar, or any evergreen may be used. A symmetrical and graceful tree should be selected, one whose limbs incline upward but little, and stout enough to bend but slightly when laden with presents.

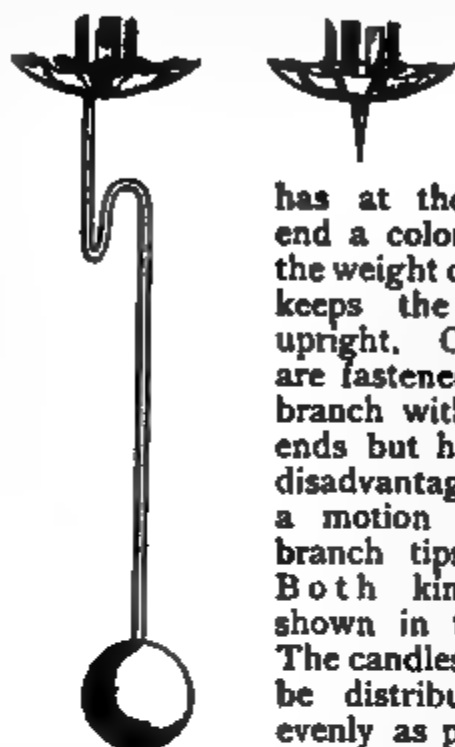
Stands to keep the tree upright may be bought in cities, but one can easily be made from an old packing box by nailing strips of wood across to hold it in place, as shown in the illustration. If the tree is tall, the box should be weighted by filling with stones, or sand, after it is put in its place. A sheet or rug should be spread on the floor to catch candle

Manner of Fastening Tree.

drippings, and another one over the box and close around the tree.

Decoration. Many beautiful ornaments of glass or metal are to be bought at toy-shops for tree decoration; others may be made at home. Almost anything bright colored or shining looks well on a Christmas tree. Pasteboard cut into odd shapes and covered with gilt or colored paper, bits of new tin or looking glass, or small fruits, may be used with effect. Pop corn strung on thread and intertwined among the branches looks well. Fruit or nuts may be painted with gold paint, or covered with gilt paper, and hung to the tree with colored ribbon.

Lighting. Trees are usually lighted with colored tapers, about three inches long, fastened to the branches with holders. The best holders are fitted to a wire, which



Candle Holders.

has at the lower end a colored ball the weight of which keeps the candle upright. Others are fastened to the branch with sharp ends but have the disadvantage that a motion of the branch tips them. Both kinds are shown in the cut. The candles should be distributed as evenly as possible.

A row of candles along only one branch looks bad in most cases. Each candle should be lighted and allowed to burn a few seconds before putting it in place. In placing the candles, it should be seen that all loose things above them are trimmed off, so that there is no danger of fire. One or two extra candles should be provided to light the tapers with, and a sponge or rag saturated with water to extinguish any that appear likely to set fire to the tree. It should be the sole business of one person, while the tree remains lighted, to take charge of the sponge, and each candle, as it burns down into the socket, should be put out. A tree may be lighted with gas by having a gas-fitter run pipes up the back of the trunk and along the branches, but nothing equals the effect of tapers. There should be plenty of them: a small tree six feet high should have not less than 50, and larger sizes in proportion. A

tree twelve feet high would need about 400 candles.

Presents. The presents may be hung on the tree, or placed on the box and floor beneath. Presents on the tree are fastened to the branches by strings or ribbons, which are to be cut by the one who removes them. Each present should be marked plainly with the name of giver and receiver, which should be read aloud when they are taken down. Instead of a Christmas tree, the presents are sometimes hung on a ladder, on the rounds of which tapers are fastened, the presents and decorations being hung to it just as to a tree. The ladder should be wound with a green wreath before decorating. A Christmas ladder is much more easily prepared than a tree, and looks very well.

Christmas Ship. Presents may be hung also on a toy ship instead of on a tree. The ship may be bought at a toy shop, and the presents should be placed inside and hung on the masts and rigging, which are wound with greens and decorated with tapers. Or the model of a floating ship may be made, water being represented by green cloth, beneath which, under the ship, is a box, where the presents are stowed, and from which they can be taken out through the hatchways.

Bran Pie. Presents are sometimes given in a large imitation pie, which is placed on the table Christmas morning. The presents, wrapped in paper, are put into a large pan and the spaces between them filled with bran or sawdust. The top is covered with pie crust, which is browned in the oven, provided none of the presents can be injured by heat. Another way is to make the top of the pie of thick brown paper. When set on the table, part of the crust is removed and the presents are taken, one by one, out of the bran.

Stockings. Small Christmas presents are often put into stockings,

hung by the fireplace on Christmas eve, larger ones being laid on chairs near by. Sometimes a large stocking, several feet long, made especially for the purpose, is hung up to receive all the presents.

Santa Claus. Santa Claus may be personated by a boy or man dressed in a thick fur coat, cap, and gloves, and stuffed out with pillows so as to look very fat. His face should be so muffled that only eyes and nose are visible, and his nose and cheeks should be colored red with carmine.

There are several effective ways of having Santa Claus enter the room. One way is for him to rattle a string of sleighbells just outside, first very softly, and then louder and louder as if his sleigh were approaching; finally he cries "Whoa!" and then enters the house—through a window if it can be arranged; otherwise through the door. He may carry the presents on his back in a pack, or they may be already arranged on a tree for him to distribute.

Another way is to place a wooden mantel in front of a door, and cover the upper part of the doorway with cloth, so that the whole looks like a chimney-piece. Santa Claus can thus enter the room through the fireplace under the mantel, as if he had come down the chimney. A chair should be placed at one side of the doorway, behind it, and Santa Claus should step down from it, so that to those on the other side he will appear to be descending from the roof. He may carry all his presents at once, or, if there are too many, leave them in the "chimney," and return now and then for a fresh supply. Large stockings may be hung on either side of the imitation chimney-piece, into which he may cram the presents, which are then taken out by some one else and distributed. The one who takes the part of Santa Claus should talk in a gruff voice as he gives the presents, making remarks appropriate to each one.

History. The celebration of a day as the birthday of Christ was begun very early. By some it is said to have been instituted by Pope Telesphorus, who lived early in the second century. At first different days were kept in different parts of the world, the Eastern churches observing generally some day in April or May. In the fourth century learned men were ordered to determine the exact birthday of Christ, and they settled on the 25th of December, which has since been adopted by all Christians, though it is probable that that was

not the day after all. It is said that this date was originally celebrated at Rome because a heathen festival called the Saturnalia had been held at that time, and so the common people would not have to change their time of revelry. During the middle ages Christmas was celebrated by the performance of religious plays called "mysteries" or "moralities," where different people took the parts of the Virgin Mary, Joseph, King Herod, etc. These plays are acted even now in some parts of Germany, and the illustra-

The Star-bearer, Mary and Joseph, and the Angel.

tions show the costumes of some of the characters. The festival was also the time for singing, dancing, and all kinds of revels. "Feasts of Fools and Asses," as they were called, were held, in which everything serious was hurlesqued. These were sometimes called "December liberties." In Germany and the North of Europe the season became especially devoted to children. In England the Christmas festivities in every large house were in charge of a "Lord of Misrule," or "Abbot of Unreason," and they continued till

Candlemas Day, February 2. In every house was built a great fire of logs, the largest of which, called the "Yule log" (Yule being the ancient Saxon name for Christmas), was brought into the house with great ceremony. Among the favorite Christmas games were giving riddles, HOT COCKLES, Snap Dragon (See HALLOWEEN), FORFEITS, and dancing. The Christmas dish was a boar's head, which was brought in on a silver platter with much ceremony. The custom of decorating houses and churches with greens is

said to have been derived from the ancient Druids, who thought that if a green branch was suspended in the house the good spirits of the

end that the world was a great tree whose top was in Paradise. It was first decorated in honor of the goddess of spring while the Germans were still pagans. At the time of the Reformation, the Protestants, who wished to break away from all Roman Catholic customs, adopted this tree for their Christmas festivities instead of the *Presipio*, or manger, which is still used largely in Roman Catholic countries. Some *Presipios* cost large sums of money and represent the Holy Family gathered around the infant Jesus, while angels sing in the clouds above. *Presipios* are used in churches and in private houses, just as we have Christmas trees for Sunday-schools and at home.

In Poland, Christmas gifts are hidden in various places throughout the house, and the members of the family search for them. In Sweden and Denmark presents are wrapped up in all sorts of queer ways, sometimes in bundles of hay or wool, and thrown in at doors or windows at unexpected times. The packages are called *Jucklapps* (Christmas boxes). Each one is labeled with the name of the person for whom it

Satan.

woods would take refuge in it during the cold of winter. The Puritans disapproved of Christmas revelry, and put a stop to it largely when they came into power. The last "Lord of Misrule" in England is said to have been appointed in 1627.

In many parts of Europe it is customary for a man with a mask over his face, dressed in outlandish fashion, to go the rounds of the houses in a village, pretending that he is going to punish bad children. This character is called Ruprecht in Germany, Krampus in lower Austria, Hans Trapp in Alsace, and has other names in other places. Sometimes he accompanies a man dressed as St. Nicholas or Santa Claus, or a girl dressed as the Christ-child, who brings presents.

The Christmas tree is supposed to be derived from the old German leg-

The Three Kings.

is intended, and sometimes a verse or quotation is added.

Settlers from different countries brought their various customs with them to this country, so our celebration of Christmas is made up of

those of several nations. The English brought theirs to Virginia, the Dutch to New York, and the Swedes to Delaware. In New England, owing to the opposition of the Puritans to the celebration of the day, it was not observed at all in old times. The Christmas tree is taken from

two or three feet long is passed through each of these holes, and the ends tied. Holding one end in each hand so that the disk is in the middle, the player twirls the disk till the string is well twisted, and then pulling his hands apart, forces the string to untwist and spin the disk. At the moment when all the twist is out of the string the hands are brought slowly together again, and the disk goes on twirling, twisting the string in the opposite direction. By pulling the hands apart again, the disk will spin in the opposite direction, and it can thus be kept on spinning as long as the player chooses. Teeth can be cut on the edge of the disk to imitate a circular saw. The edges of the holes in a tin saw cut the string, so similar toys are sometimes made of stiff pasteboard, but these are not so durable. The saws are sometimes called water cutters, because, when the edge is made to touch the surface of the water in a basin, a shower of spray is sent out. The toy may be made of any convenient size, but it is usually from three to six inches in diameter.

The Pharisees.

Germany, and the legend of Santa Claus (St. Nicholas) was brought by the Dutch to New York. In the South the day is made the occasion for setting off fire-crackers and fireworks, which makes it seem much like Fourth of July in the North.

CHROMOTROPE. See **FOURTH OF JULY.**

CIRCULAR SAW, a toy consisting of a disk of tin, through which are bored two holes from an inch to an inch and a half apart, and equidistant from the center. A string

CLAP IN AND CLAP OUT, a game played by any number of boys and girls. The boys stand each behind a chair, and the girls go into another room. One of the players, who acts as keeper of the door between the two rooms, asks one of the boys to choose a girl. The door-keeper then opens the door and calls the girl thus chosen, who must sit



Circular Saw.

down in one of the chairs. If she sit in front of the boy who chose her, he kisses her and she keeps her seat, but if not, all the boys clap their hands as a sign that she is wrong,

and she must leave the room again. The door-keeper asks another boy to choose, and the game goes on till all the chairs are filled. The boys then leave the room, the girls

stand behind the chairs, and the game is repeated. The play is often varied by calling in three or four at a time.

CLIPPED SQUARES, a game played by any number of persons, with paper and scissors. Each player cuts a square, and then clips it into four pieces by two straight cuts of the scissors. He then mixes the pieces and passes them to the player on his left. All the players now try to arrange the bits so as to make the original square, and at the expiration of five minutes, or any other period agreed on beforehand, those who have been successful score one point. Each one now passes his pieces to the left again, and so on till each has had before him all the clipped squares, in regular order. He who has scored most points is the winner. The time limit must be arranged according to the skill of the players. If no one has solved his puzzle at the expiration of the time it should be longer; if almost all have succeeded, it should be made shorter.

The task of putting the pieces together seems very simple at first, but in reality it is difficult. The four pieces can be put together in no less than 256 different ways, only one of which forms a square.

The game can be played as a **SOLITAIRE** by simply clipping a square and then trying to put it together again, which will be found almost as difficult as though the clipping had been done by another person.

CLUB SWINGING. See GYMNAS-TICS.

CLUMPS, a guessing game played by any number of persons. Two of the players, who act as captains, choose sides, and then each captain sends one of his men out of the room. The two thus sent agree on the name of any person or object, real or fictitious, to be guessed by the rest of the company. Each of the two then sits down among the

players of the opposing side, who try to guess the object that has been selected, by asking him questions, to which he is permitted to reply only "yes," "no," or "I do not know." The players on the side that succeeds first in guessing announce the fact by clapping their hands, and the winning captain can then choose a man from the defeated side. Two men are then sent out again, and the game may go on till all but one of the players on one side have been chosen, when it must cease, because two on a side at least, are necessary, one to ask questions, and one for the enemy's side to question. As this generally takes a long time, an hour may be agreed on beforehand, when the players are to be counted, and the side with the greater number wins. The sides are often called Clumps.

RULES OF THE GAME.

1. The two Clumps must sit in separate rooms or, if this is impossible, at opposite ends of the same room.

2. The questioning shall begin at exactly the same time on each side, by any signal that may be agreed on.

3. To avoid confusion, the captain on each side shall put the questions for his Clump, which may be suggested to him by members of the Clump in any order.

4. If any question is put in such a form that it cannot be answered by "yes," "no," or "I do not know," no answer at all shall be made.

5. As soon as the subject is guessed each of the questioned players shall return to his own Clump, unless he be the one chosen by the winning side.

6. Neither of the captains shall be chosen.

COASTING. (See C. C. T., Sleigh). There are three principal ways of riding on a sled; sitting, lying, or kneeling on one knee, each of which positions has its advantages. In sitting, if the rider runs against anything his feet bear the shock, but he

cannot easily take a run in starting. In lying flat, the coaster starts by holding his sled upright in both hands, taking a short run, then stooping and throwing himself face downward on the sled. Besides the advantages gained by such a start it is easier to steer in this position, but he is more apt to be hurt in a collision, since his head is foremost. Many coasters prefer the third position, kneeling on one knee, or sitting sidewise on the rear of the sled, and steering with one leg, which is trailed behind. This is the best plan when more persons than one are on the same sled. All sit upright but the hindmost one, who does the steering. The steersman should keep a sharp lookout ahead for curves and obstacles of all kinds.

On a hill crowded with coasters, it is the duty of those who are walking up to keep out of the way of the sliders. A coaster should never descend a hill on which there is a vehicle going either way, and if there is much passing, there should be no coasting there at all. In many places coasting on such hills is forbidden by law, but in some towns certain streets are set apart specially for the use of coasters.

The two chief kinds of sleds are the high and the low, the former sometimes called cutters, and the latter in some places "pickerel" or "pig-stickers." The former have runners of open framework, shod with iron; the latter have solid wood runners shod with bars of steel, fastened only at the ends. The runners of the high sleds curve upward sharply in front, while those of the low ones curve but slightly and end in a sharp point. The low sleds are best suited for a coaster lying flat, and for smoothly worn hills, while the others are fitted for tracks on which the loose snow is an inch or so deep. The sleds called "bobs" or "double rippers" are formed by joining two ordinary sleds of the same height by a plank ten to twenty

feet long. This plank is fastened firmly to the rear sled, and pivoted to the forward one so that it will turn freely. The steering is usually done with the forward sled; if it projects beyond the plank, the steersman lies at full length and holds the curved ends of the runners one in each hand, thus being able to turn the rudder-sled in whichever direction the bob is to be steered. Sometimes the pivot on which the sled turns is brought up through the plank and fitted with a lever, so that the helmsman may sit upright as he steers. A short bob may have both sleds fixed, and be steered behind, like an ordinary sled, and sometimes the guiding is done with an extra runner, something like the rudder of an ice-boat. In any case, the last passenger on the bob starts it by running and pushing, and jumps into his seat just as the proper speed is attained.

Some bobs are expensively made of fine wood, beautifully polished and fitted with cushions for the passengers. There is usually a hand-rail on each, by which the coasters may hold on.

Accidents in coasting, as in other sports, occur usually through heedlessness or neglect. With a single sled, the coaster is responsible only for his own safety, but in "bobbing" a load of from four to ten passengers are at the mercy of the steersman, and they should be careful to ride with no one who is not clear-headed and prudent. If the hill is a proper one and the bob or sled is well steered, coasting is as safe as any other sport.

Coasting has undoubtedly been followed as a sport in cold countries from the most ancient times in some rude form or other. Even animals practise it, the otter being very fond of sliding down slippery banks either of mud or snow, on his belly. The sport was probably first reduced to a system in Russia. (See the history of TOBOGANNING.)

COBALT CHLORIDE, Experiments with. 1. Write on a piece of paper with an ink made of cobalt chloride dissolved in water. The marks will be nearly invisible till heated, when they will turn greenish blue.

2. Draw a landscape in ordinary ink, afterward filling in the leaves and grass with cobalt chloride. The picture will represent winter or summer according as it is damp or dried.

COHESION FIGURES. Figures formed by dropping oil on water. Let a drop of pure sperm oil fall into

center becomes filled with little holes, forming curious figures. The film continues to change for about half an hour. Castor oil gives smaller figures, and in general every kind of oil gives figures of a different shape. These figures can be preserved by laying a piece of glazed paper carefully on the surface of the water after the film has assumed the desired shape. The paper is then laid on an inked plate, or an inked roller is passed over it. The ink sticks to the paper except where the oil has made it greasy, hence the cohesion figures appear in white on a black ground. These are sometimes called oleographs. The illustrations show oleographs of tallow and lard.

COINS, Tricks with. 1. *Head or Tail.* To tell blindfold whether a spun coin falls head or tail upward. The coin used must be prepared by cutting on the edge of one face a minute notch causing a little point of metal to project. When the coin is spun, if it goes down with the notched side underneath, this point will catch on the table causing the coin to fall suddenly, instead of gradually as it otherwise would. With a little practice the two sounds may be easily distinguished.

2. *To rub One Coin into Two.* Previously stick a coin with wax underneath a table, close to the edge. Borrow a similar coin and rub it violently with the ball of the thumb against the edge of the table. The fingers will thus naturally be beneath the table, and the waxed coin can easily be removed at any time and added to the one that is being rubbed.

3. *The Wandering Coin.* Have ready two coins each slightly waxed on one side. Borrow a similar coin and secretly exchange it for one of the waxed ones, which is then laid on the table, waxed side uppermost. Draw two cards from a pack, and take them in the same hand with the other waxed coin, which will thus stick to the under-

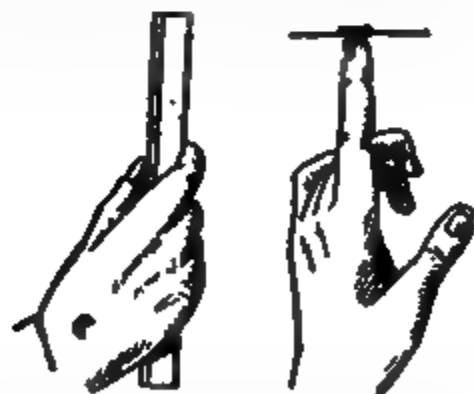
Oleographs of Tallow and Lard.

a basin or plate full of water. The drop will quickly enlarge into a circular film of oil, which breaks at the edges into ragged holes. Finally the

most. Lay this card on the table near the coin which is already there and cover that coin with the other card, pressing lightly on it so that it will stick. A coin may now be made to appear under whichever card the performer wishes, for if he bends the card slightly upward in lifting the coin will not stick to it; otherwise it will. To the audience it will appear as if there were but one coin, which the performer caused at will to pass from one card to the other.

4. *The Animated Coin.* Have ready a long piece of black thread, to one end of which is fastened a bit of wax. The waxed end lies on the table in front of the performer; the other is held by an assistant in an adjoining room. On the table stands an ordinary goblet. The performer borrows a coin, and contriving to stick the wax to it throws it into the goblet, calling on the spectators to ask it questions which it will answer by jingling in the glass. It may be agreed that one clink shall mean "yes" and two "no." The assistant must be near enough to hear the questions, and answers them, according to his fancy, by pulling the thread, making the coin jump up and down in the glass.

5. *Coin and Card.* Balance a card on the tip of your forefinger. On



Coin and Card.

top of it balance a coin about the size of a nickel five cent piece. Hit the edge of the card a smart horizontal blow with some object like a pencil, or snap it with your finger, if you can

do it directly forward without tending to drive the card up or down, and the card will fly away, leaving the coin balanced on your finger.

6. *Coin and Goblet.* Support a

Coin and Goblet.

glass goblet upside down on two coins, as shown in the picture, on a table covered with a cloth. Place a third coin within, and ask the company to remove it without touching or removing the glass. This may be done by scratching on the cloth near the glass.

7. *Coins in Water.* Fill a glass

Coins in Water.

goblet brimful of water, and then ask the company how many coins

can be dropped in without spilling it over. The guesses will all be too small, for a surprising number can be put in if it be done carefully.

COIN COPYING. To obtain an exact copy, in copper, of a coin or medal, first make a mold of wax or plaster of Paris. A wax mold is made by pressing the coin down on a piece of warm wax, brushed over with sweet oil to prevent sticking. A plaster of Paris mold is made by fitting a little paper rim around the coin and pouring into it a mixture of plaster of Paris and water, which will soon become hard. In this case the coin should be brushed over with sweet oil for the same reason as before. The mold must then be covered thickly with finely powdered graphite, which can be obtained by crushing either graphite stove blacking or pencil leads. When the mold is well covered with a thin layer of this, it is attached to the negative wire of a battery and hung in a solution of copper sulphate (blue vitriol). The positive wire of the battery is attached to a copper coin suspended in the same vessel. The electric current will decompose the copper sulphate depositing copper on the mold. After a time the layer of copper may be pulled off the mold, and its lower surface will be an exact copy of the coin from which the mold was made. The process is exactly like that of **ELECTROPLATING**.

COIN WINDMILL. A coin can be made into a toy windmill with the aid of two pins. Lay the coin flat on a table or on the knee and press the points of the pins against opposite edges, keeping the pins exactly in the same straight line. The coin may now be lifted by the pins, but if it hangs vertically this shows that it is not perfectly balanced, and another trial must be made. When it is properly balanced it will keep horizontal as it is lifted. By blowing on one side, the coin may now be made to spin very rapidly between the pins.

COLLISION BALLS, Experiments with. Take half a dozen large glass marbles and paste a little strip of leather to each so that it may be suspended by a thread. The paste should be slightly moistened gum tragacanth, which, though it does not hold the leather to the glass when wet, sticks strongly after it dries. Insert a broom straw between the leather and glass before the paste is dry, and afterwards, when it is removed, a hole will be left for the thread. These glass balls must be hung side by side on a frame or to the edge of a table or shelf. They should just touch each other, without pressing against each other at all.

EXPERIMENTS.

1. Draw aside the end ball and let it fall against the next. All the balls will remain at rest save the one at the other end which will fly off. As it falls back against its neighbor the first one will fly aside again, and so the end balls will continue to move alternately. Soon the middle balls will begin to move a little and at the end the whole half-dozen balls will sway to and fro slightly. If the balls were perfectly elastic the middle balls would never move, but always remain still as at first. The first ball struck is squeezed together a little, and expanding, squeezes its neighbor, and so on till the last ball is reached, which, having no neighbor, flies aside.

2. Draw aside the two end balls and let them fall together. The two balls at the opposite end will fly off together.

COMMERCE, a game played by any number of persons, with one or more full packs of cards, according to the size of the company. The dealer gives each player five cards, two and three at a time, and then deals five others face upward on the table. The latter are sometimes called the "widow." The player at the dealer's left may exchange any or all of his cards for an equal number

in the widow, placing those he discards face upward on the table with those he leaves, or he may "pass," that is, decline to exchange. The next player in order has the same privilege, and so on till each has had two chances, but any player who passes on the first round must do the same on the second. The hands are then shown, and he who has the lowest retires from the game. The value of the hands is the same as in DRAW POKER. At the close of the next hand another player retires, and so on till only one is left, who is the winner. Sometimes, if the company is large, two or three players retire each time instead of one. In this case, if more than one player is left at the end, he who has the highest hand wins. There are many varieties of this game; some of the most common of which will be described.

A retired player is sometimes allowed to enter the game again if he can induce an active player to speak to him. In this case the player who so speaks must retire from the game.

Sometimes a player does not retire until he has twice held the lowest hand.

The game is often played without any widow. Each player in turn must either trade, barter, or stand. In trading, the player exchanges one of his cards for the top card of the remaining pack, the rejected card being placed under the pack; in bartering, he exchanges a card with his left-hand neighbor; if he is satisfied with his hand as it is, he says "I stand." No player's left-hand neighbor may refuse to barter, unless he intends to stand. In bartering, each may select the card he wishes to exchange, but may

not see the other player's card till the change is made. When any player stands, trade and barter cease, and the hands are shown at once.

When parties are given at which this game is played, it is customary for the hostess to give one or more prizes to the winners. Sometimes a boy's prize and a girl's prize are offered, in which case the boy and girl holding the lowest hands respectively retire at the end of each round.

Three-Card Commerce. Each player is dealt three cards, and the hands are as follows in the order of their value, beginning with the highest:

1. *Tricon*, three cards of a kind.
2. *Sequence*, three cards in succession.
3. *Flush*, three cards of the same suit.
4. *A Pair*, two cards of a kind.
5. *Point*, the greatest number of pips on the cards held, counting the Ace as eleven, and face cards ten each.

COMPASS. A simple mariner's compass may be constructed as follows. Magnetize an ordinary knit-

Home-made Compass.

ting needle, E (see MAGNETS), and pass it through a small cork, F, from side to side, so that the cork is exactly in the middle of the needle. Thrust a pin lengthwise through the same cork, and then stick in it two sharpened matches, C, so that they project downward diagonally. On the ends of the matches fix balls of wax. The

whole arrangement can now be balanced on a thimble, D, by resting the point of the pin in one of the little holes on the top. If the knitting needle is not horizontal, pull it through the cork to one side or the other, or alter one of the wax balls. The whole is placed in a common earthenware pudding dish, T, and covered with a pane of glass. A disk of paper, A, with the points of the compass marked on it, may be fixed under the needle, when the whole arrangement will appear like the illustration. For experiments with the compass see MAGNETS.

COMPLIMENTS, a game played by any number of persons, who sit in a circle. One of the players begins by wishing that he were some animal, bird, or other object, living or not, as he may choose. He asks his right-hand neighbor to give a reason for this choice and the answer must not be complimentary. He then asks the same question of his left-hand neighbor, who must return a complimentary reply. Each player makes a similar wish in turn and asks the same questions of his neighbors. Should any one's answer be complimentary, instead of uncomplimentary, or the reverse, the offender must pay a forfeit.

For example, suppose the player wishes to become a dog. His right-hand neighbor may give as a reason, "That you may indulge your propensity for making hideous noises"; and his left-hand neighbor may say, "Because of the faithfulness, intelligence, and noble character of the animal."

COMPRESSED MAN, THE, a trick performed by two boys. One asks the other if he is willing to be compressed to half his height, and the two then retire from the room. One stands in front of the other and two poles are placed on their shoulders to imitate the poles of a bier or stretcher. A small pillow is placed across the poles behind the rear boy, who leans his head back upon it and

rests his arms at full length along the poles, which must be long enough to allow his hands nearly to reach the back of the forward boy. Boots are placed on his hands, and then his arms are covered with a blanket.

Fig. 1.—Compressed Man.

This arrangement causes him to look as if he were carried by two men on a stretcher, reduced to a height of about three feet. The spectators will not notice at first that

Fig. 2.—Compressed Man.

the rear bearer's head is invisible, or they will think that it is underneath the stretcher, concealed by the blanket.

Fig. 1 shows the arrangement

before the blanket is put on ; Fig. 2, the appearance afterward. An "extended man" can be made in a similar manner by placing the boots on sticks held in the hands of the rear performer, but the effect is not so striking. While the performers are absent from the room one of them should saw a piece of wood, while the other should groan, and a little sulphur may be burned to excite the interest of the spectators.

CONDUCTION OF HEAT, Experiments on. 1. Take a copper wire, an iron wire, and a glass rod, and dip them in melted wax, so as to form a coating on each. Lay them on a table with the ends projecting about two inches over the edge and crossing each other. Hold an alcohol lamp under the place where they cross so as to heat them all equally. The conduction of the heat along the rods can be traced by the melting of the wax, which will take place fastest on the best conductor of heat. Beyond a certain point on each rod the wax will not melt. This is because the heat escapes from the air on all sides of the rod, so that there is not enough left to melt the wax beyond that point. The wax, however, will be melted much farther on a good conductor than on a poor one.

2. To the lower surface of an iron rod stick at intervals, by means of wax, balls of wood or bullets. Heat one end of the bar in an alcohol flame and the balls will drop off one by one as the wax is melted, beginning with the one nearest the flame. If bars of different substances be used, it will be seen that some of them conduct the heat of the flame faster than others.

3. Hold a scrap of paper beneath a wooden penholder so that half is in contact with the wooden handle and half with the metal part that holds the pen. Hold the penholder and paper over the flame of an alcohol lamp, and the part touching the wood will be charred, while that un-

der the metal is yet white. This is because the metal conducts the heat more quickly than the wood does.

4. Place one within another two tin pails, of such sizes that when together there will be a space about two inches wide between them. Fill this space, including that at the bottom, with old newspaper crumpled into balls and packed in very tightly. Fill the inside pail with water at 100° Fahrenheit, put on the cover, pack the space above it with paper, and then put on the outer cover. This arrangement makes a vessel which conducts heat very slightly. If the water is tested after several hours its temperature will be only a degree or two lower, whereas water in an ordinary pail will cool to the temperature of the room in the same time.

5. Water may be boiled in a paper box, as shown in the illustration, owing to the fact that the heat is all

Boiling Water in a Paper Box.

required to boil the water, so that the paper is kept below the charring point.

THE CONFESSOR, a game played by any number of persons, one of

whom is chosen as confessor and the others personate penitents. Each of the players is given a pencil and a slip of paper. The confessor writes on his slip what he wishes to consider the capital sin, and then, addressing the player at his left desires him to confess his sins, at the same time handing him a TETOTUM. The penitent spins the tetotum on a table, and the number that it turns up shows how many sins he must confess. He writes them on his paper and hands it to the confessor, who reads the sins aloud, and then proceeds to the next player on the right. Any player who confesses the capital sin, or any one of the sins that have already been confessed, must pay a forfeit. The name of the capital sin is not told to the company till all have confessed. Then, if desired, another confessor is chosen and the game goes on, entirely new sins still being required, on penalty of a forfeit. The game is made more amusing if the confessor and the penitents act out their parts. If it is so agreed before the game, anyone who laughs may be made to pay a forfeit.

CONSEQUENCES, a game played by any number of persons, each with pencil and paper. The players usually sit around a table and the first writes at the top of his paper an adjective describing a man, then folds the paper over the word so as to hide it, and passes it to his left-hand neighbor. Each then writes, just under the hidden word, the name of a man, either a historical character or some acquaintance, and folding the paper, passes it as before. After this the following things are written in like manner, the paper being folded and passed after each. (3) An adjective describing a woman. (4) A woman's name. (5) Where the man and woman met. (6) What he said. (7) What she replied. (8) What the consequences were. (9) What the world said. When all these have been written, the papers are

mixed in the middle of the table, and each player draws one which he must read aloud; or, all the papers may be read by one player, chosen for the purpose. The reader fills in the words necessary to make a connected story.

The names of the players are often used with amusing effect. For instance, one of the papers may read, "The gentlemanly Henry VIII. and the slovenly Mary B——, met in the Metropolitan Museum. He said, 'Do you like apples?' and she replied, 'Not on Sundays.' The consequence was a tremendous explosion, and the world said, 'What else could you expect?'"

The words and sentences written may be varied as agreed on at the beginning of the game. For instance, "What he gave her" and "What she gave him" are often put in. In its simplest form the game consisted of writing merely a man's name, a woman's name, where they met, and the consequences.

A different way of playing the game is for the players to write each of their words or sentences on a separate card or slip of paper, numbering them as above. The slips are then gathered in piles, each pile containing those of one number, and each player draws one from each pile, arranges them in order, and reads the story that results. Or, if there are just as many players as piles, each may be given one, and then each, in the order of the numbers, may read one of his cards.

The game may be played many times with the same cards if each pile is shuffled after every reading. Sometimes words or sentences printed on cards of different colors are sold at the toy shops, to be used in playing this game or similar ones.

CONTUMACY, a game of cards played by three persons with a EUCHRE pack. The players cut for deal, and he who cuts the lowest card gives three cards to each player.

Beginning with the eldest hand, each may then discard his hand, if not satisfied with it, and call for a new one. No one can discard part of a hand, and when any player has said he is satisfied he must keep his hand. Each of the other players may thus draw two new hands, and the dealer may draw three. The dealer then leads from any suit he pleases, and names another. The other players are expected to play in the named suit, taking just as if they were following suit. Thus, if the dealer lead the Five of Clubs and says "Hearts," the Six of Hearts will take the trick, but the Six of Clubs will not. If either player wish to play a suit which has neither been named nor played, he can do so, but to take the trick his card must be the second one above the card which would otherwise take it. He may play thus from choice or because he cannot do otherwise. In either case he is said to be "contumacious." It will be seen that the first contumacious player in any round has two suits to choose from, but one at third hand, where the second hand has already been contumacious, has but one. Thus, if the dealer lead the Four of Spades, and say "Hearts," and the second player (choosing to be contumacious) play the Six of Clubs, the third, if he also is contumacious, must play a Diamond higher than the Seven to take the trick. But in the named suit (Hearts), a Seven would take it. The dealer continues to lead till the hands have been played. He must not name the same suit twice in succession, nor must he name the suit he leads. The cards rank as in ECARTÉ, the Ace being between the Ten and Knave. The Ace of Spades is a special card, and is not allowed to win a trick in contumacy. When played in the named suit it has its ordinary value, but when led it must always take the trick.

COPENHAGEN, a game played by any number of persons, who stand

in a circle holding a rope whose ends are tied together. One of the players stands in the middle of the ring, and tries to slap the hands that hold the rope, using only one of his own hands at a time. The players must always hold the rope with at least one hand, and can try to escape being slapped only by changing hands rapidly, taking hold first with one and then with another. If any one's hand is slapped or he lets the rope go altogether, he must take the place of the one in the ring. As the game is often played, a girl tries to slap only boys' hands and a boy only girls' hands, and when a hand is slapped the players kiss as they change places.

CORK, Experiment with a. Place in the neck of a wide-mouthed bottle a cork considerably too small for it, and try to blow it into the bottle. Instead of going in, it will generally fly out. The reason is that the blowing compresses the air within the bottle and this, recoiling like a spring, drives the cork out. To succeed, the experiment must be tried with bottle and cork perfectly dry so that one will not stick to the other.

CORK, The, a game in which the players try to knock a cork from the top of a bottle. The bottle is placed on a table and the cork set loosely on the neck so that it can easily be knocked off. Each player in turn, standing on the opposite side of the room, holds his arm directly before him, with forefinger extended. He must then walk slowly toward the bottle and with a single movement of the arm knock off the cork without disturbing the bottle. The player wins who succeeds in doing this the greatest number of times in a number of turns previously agreed upon. The task, though seemingly easy, is really difficult. Most players will strike above the cork, the reason being that he has an involuntary fear of hitting the bottle.

CORN AND BEANS, a game played by any number of persons,

one of whom, called the Professor, reads questions from a card, while the others hold cards bearing the answers. The Professor's card bears any number of questions, usually forty, on historical or other subjects, and there are the same number of other cards each containing the answer to one of the questions. After a Professor has been chosen, the answer-cards are distributed equally among the others. A quantity of corn and beans, for use as counters, is also distributed equally. The Professor begins by reading any question he chooses. The holder of the answer must cry "Corn!" and all the others must cry "Beans!" If the holder cry first, he reads the answer and hands the card to the Professor. If one or more cry "Beans" first, he must give each of them a corn or bean and hold the answer-card till the question is asked again. If any one cry either "Corn" or "Beans" wrongly, he must give a corn or bean to each of the others. If the Professor ask a question which has already been answered, the first one to discover it cries "Corn and Beans," and changes places with the Professor, who becomes an ordinary pupil. The game lasts until the Professor has all the answer-cards. Should any one pay out all his corn and beans, he must borrow of a neighbor. The first one to dispose of his answer cards is called the "Model Scholar"; the first one out of corn and beans, the "Bankrupt," and the player having most corn and beans at the end of the game, the "Millionaire."

COTTON, Experiment with. Take a glass nearly full of alcohol, and as much loose cotton wool as can be held in an ordinary stiff hat. Put the cotton into the alcohol, a little at a time, pushing it down with a glass rod slowly, so that the alcohol will have time to soak it thoroughly. It will be possible to put all the cotton into the glass without making the alcohol run over. The reason is

that the cotton really takes up very little room, as would be seen if it were squeezed or pressed together very tightly.

COUNTING OUT, deciding who shall be leader of a game, or take some special part in it. In this country the one who takes such a part is called "It." In England he is sometimes called "He," in France *Le* (It), and in Germany he is said to be *daran* (in). Sometimes to be It is a desirable thing, and sometimes not. When it is desirable, the players often shout "I choose to be It," or some similar form of words, and he who shouts first is given the post. When it is undesirable, it is often agreed that all shall run to some tree or gate, and that he who gets there last shall be It. The question is often decided by lot in some of the various ways described under CHOOSING SIDES. Sometimes one of the players numbers the others, counting from one to seven and then beginning again. Each seventh player drops out, till finally only one is left, who must be It. But the most common method is by "counting out rhymes," of which there are a great number. The players stand in a row, and one reciting the rhyme, points to them in order, indicating one at each word. He to whom the last word falls, drops out of the line, and the rhyme is thus repeated till only one is left, who must be It. The counter-out of course points to himself in the proper order. Most counting out rhymes have a whole word for each beat or accent, but, some have more than one, and in this case some counters-out point once for each word, and others once for each accent. Thus in the lines,—

Little boy driving cattle,
Don't you hear his money rattle,

some persons point only for the accented words in the second line, while others point for each word.

Several of the most common count-

ing-out rhymes are given below. Most of them have almost countless variations.

Overy, uvery, ickory, Ann,
Fillisy, follasy, Nicholas John,
Queevy, quavy, Irish Mary,
Stingalum, stangalum, Buck.

Eeny, meeny, mona, my,
Barcelona, bona, stry,
Kay bell, broken well,
We, wo, wack.

Intery, mintery, cutery, corn,
Apple seed, briar thorn,
Wire, briar, limber lock,
Three geese in a flock ;
One flew east, one flew west,
One flew over the cuckoo's nest,
O-u-t, out !

One, two, three, four,
Lily at the kitchen door,
Eating grapes off the plate,
Five, six, seven, eight.

Monkey, monkey, bottle of beer,
How many monkeys are there here ?
One, two, three,
Out goes he (or she).

Stick, stock, stone dead,
Set him up, set him down,
Set him in the old man's crown.

Onery, twoery, dickery, davery,
Hallibone, crackabone, tenery, lavery,
Discontent, American pine,
Humble-ey, bumble-ey, twenty-nine.

One-i-zol, two-i-zol, zig-i-zol, zan,
Bobtail, vinegar, tickle, and tan,
Harum-scarum, Virgin Marum,
We, wo, wack.

COURT TENNIS. See **TENNIS.**
COVENTRY, The Earl of. See
EARL OF COVENTRY.

CRAMBO, a game played by any number of persons, who try to guess a word by means of another which rhymes with it. One of the players thinks of a word, and then tells the others what it rhymes with. The

players who guess do not speak the words that occur to them, but tell their meaning. Thus, one chooses the word pin, and says, "I think of a word that rhymes with tin." Another asks, "Is it a part of the face?" and the answer is, "No, it is not chin." "Is it a loud noise?" "No, it is not din," and so the game goes on till the word is guessed. Those guessing often try to make the meanings they give hard to understand, so that most of the guessing is on the other side. If the one who thinks of the word cannot understand his questioners he may ask them to repeat the question differently. The guesses need not be made by the players in order.

Acting Crambo, or Dumb Crambo, a kind of Crambo in which, instead of telling the meaning of the words that are guessed, the players act them in dumb-show. Two of the company generally choose sides, and one side leaves the room, returning to act its guesses after being told what the chosen word rhymes with. The acting may be done by one person and be simply a movement of the hand or body; as, for instance, in guessing the words "shake" or "bend," or the whole side may act a long **CHARADE**. Sometimes a game played in this way will last a whole evening. The game of **QUESTIONS AND ANSWERS** is also sometimes called Crambo, but it is quite different.

History. The name Crambo was given in old times to several rhyming games. The Spectator speaks of "those who play at Crambo or cap verses." The word means a rhyme, and is said to be from the Latin *crambe* (repetition). This word meant cabbage in Greek, and came to signify a tiresome repetition through the proverb, "a cabbage twice boiled is death."

The natives of the Samoan Islands in the Pacific Ocean play a kind of Crambo. A traveler there says: "One party would choose the names of

trees, and another the names of men. Those who sided with the trees would say, 'There is the *Tan* tree; tell us a name which will rhyme to it.'

CRIBBAGE, a game of CARDS played by two, three, or four persons, with a full pack. Two-handed six-card Cribbage, the common game in this country, will be described first:

Points. The following is a list of the points that can be made in Cribbage.

A pair (two of a kind, as two Queens or two Eights) counts 2.

A pair royal (three of a kind) counts 6.

A double pair royal (four of a kind) counts 12.

A sequence (three or more cards in succession, of the same suit or not), counts as many points as there are cards in it. In a sequence the Ace counts below the Two, and not above the King. Any number of cards the sum of whose spots is 15 (counting face cards as 10), counts 2. A Knave of the same suit as the trump card counts 1 (called "one for his nob"). Turning up a Knave as trump counts the dealer 2 (called "two for his heels"). A flush (four or five cards of the same suit), counts 4 or 5 as the case may be.

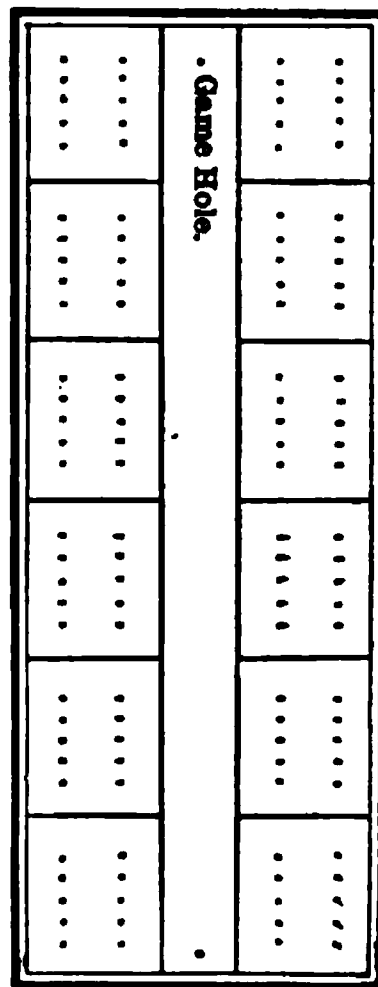
The deal is determined by cutting (see CARDS), and six cards are dealt one by one to each player. Each now takes out two cards from his hand to form what is called the Crib. This is the property of the dealer, but he must not look at it till the hand is played; the four cards that form it are placed by themselves, face down, on the table. The non-dealer now cuts the pack, and the dealer turns up the top card of the lower pile as trump. Beginning with the non-dealer, the players in turn then lay down their cards, one by one, face upward, each making a pile of his own. As each card is put down, its owner calls out the sum of the spots on all the cards which have been played (face cards count-

ing 10); thus, A may put down a Six and say "six," B a Seven and say "thirteen" and A a Queen and say "twenty-three." When thirty-one is reached the counting begins over again. If either one makes exactly thirty-one he scores two points, and if neither can do so he who comes nearest it scores one, which is called a "go." Thus, taking up the play of A and B where we left it, suppose B plays a Five and calls out "twenty-eight." If A has nothing lower than Four he must say "Go," meaning that B can score one for a Go, as he has come nearest 31. If B can play again, he must do so before scoring, and if he can make 31 he scores two instead of his Go. He who plays the last card in the hand also scores one. In playing, if any of the groups in the above list are formed, except a flush, he who plays the last card in the group scores for it but the cards must be played in succession. The cards of sequence may be put down in any order; thus, 2, 5, 3, 4, would be counted by the one playing the last card as a sequence of four (2, 3, 4, 5); and if the next player should then play an Ace, he would count a sequence of five (1, 2, 3, 4, 5). The same cards can be counted again to make a higher group: thus, if A plays an Eight, and B another Eight, making a pair and scoring two. A may play a third Eight, making with the other two a pair-royal, and scoring six. But when thirty-one is reached, all making of groups must begin anew. Fifteen counts only at the beginning of play; thus if A plays a Six, B a Ten, and A a Five, A cannot call the Ten and the Five fifteen. Making points during play is called, from the mode of counting, "pegging." When play is over, each gathers up his hand and reckons up the points in it. The non-dealer counts his first, and is said to "have first show." This is an advantage, especially at the end of a close game, when he who has first

show often wins. The cards must be spread on the table face upward, so that both players may see. In reckoning, the trump card counts as part of each hand. All the cards in one group cannot be counted as part of a larger group as in playing, but any number less than the whole can be so counted. Thus, if a player have three Queens he can count them only as a pair royal and not as separate pairs also; and if he have for instance, Nine, Ten, Knave, Queen, he can count only a sequence of four and not the separate sequences of three. But if he have Nine, Ten, and two Knaves, or Nine, two Tens, and a Knave, he can count two sequences of three, only two cards being the same in both groups. This is called a double sequence of three, and evidently scores eight, counting the pair. A double sequence of four would in the same way count ten. So, too, with one Five and three face cards, three fifteens can be formed, and with two Fives and two face cards four fifteens.

The dealer counts his Hand before looking at his Crib, and the Hand and Crib are reckoned separately. The trump card is counted with the Crib also, and the Crib is reckoned like the Hand, except that a flush of four does not count in it. In counting fifteens the score is added to the word fifteen; thus, if a player has three of them he says he has fifteen-six, and if five of them, fifteen-ten. Experienced players reckon their hands very fast, and this part of the game is excellent training in addition. After the reckoning, the players deal alternately, until one has made 61 points, which wins the game. The score may be kept simply with pencil and paper, but it is usual to mark it with pegs on a Cribbage board like that in the illustration. In marking, each player uses one side of the board, his peg traveling the outside row of holes, returning by the inside row, and finishing in the end hole.

Each player usually has two pegs, and the points are marked with them alternately, so that the number of



Cribbage Board.

holes between them always shows the last score that was made.

The game will be made clearer by carefully playing through the following sample hand. Suppose the cards to be dealt and that they are distributed as follows, A being the dealer.

A puts in the Crib a pair of Eights, because they form a group with nothing else in his hand, and because the Crib is his own. If it had been B's Crib he would have hesitated before giving his opponent a pair. B should put in his Seven and Queen, leaving himself a flush. The cards in brackets thus form the Crib. B cuts, and A turns up the Five of Clubs.

B leads with his Four of Clubs, saying "four."

A plays his Four of Spades, saying "eight" (and scoring two for a pair).

B (having no Seven to make 15)

plays his Six of Clubs, saying "fourteen."

A plays his Five of Hearts, saying "nineteen" (and scores three for the sequence 4, 5, 6).

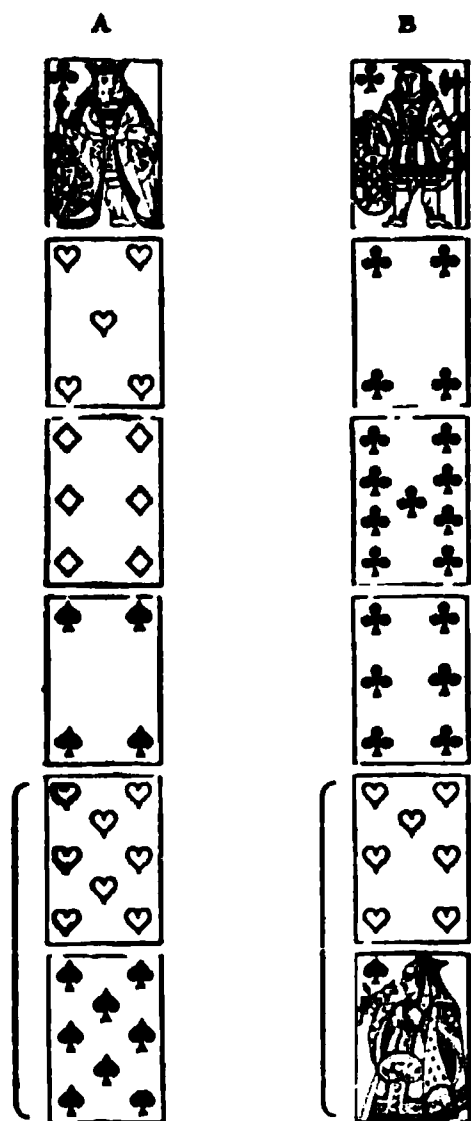
B his Nine, saying "twenty-eight."

A (having no card that will make with this 31, or less), says "Go" (and B scores one).

A plays his King, saying "ten."

B his Knave, saying "twenty."

A his Six, saying "twenty-six" (and scores one for the last card). The score in pegging thus stands 6 for A to 1 for B. B, having first show, spreads out his hand. The



trump card makes one fifteen with his Knave, another with his Four and Six, and his Nine and Six make a third. His cards and the trump card are all clubs. Therefore his score is "fifteen-six; a flush of five makes 11, and one for his nob makes 12." A has two fifteens in his own hand, and can make two more by using the trump. His Four, Five, and Six, with the trump, give him a double sequence of three as before

shown. His score is "fifteen-eight, and a double sequence of three makes 16." The points in the crib are "fifteen-six and a pair makes eight." A's total score for the hand is 30, and B's is 13.

Five-Card Cribbage. Each player has five cards, two of which he discards for the Crib as before, leaving him only three. The method of play is the same as in the six-card game, except that when thirty-one is reached, play stops, and the remaining cards are not put down. A flush of three counts in the hand, but not in the crib, where it must consist of five cards as before. In opening this game, the non-dealer is allowed three points to begin with. Five-card cribbage is considered a more difficult game than six-card. It requires more skill, and is preferred by many players.

Three-Handed Cribbage, a kind of Cribbage played by three persons, each on his own account. Each has five cards, and an extra one is dealt to the crib, to which each adds one card. The board for this game is three-sided.

Four-Handed Cribbage, a kind of Cribbage played by four persons, in partnerships of two. Each is dealt five cards and discards one for the crib. The one at the dealer's left cuts for the trump and begins to play, and the others follow in succession to the left. The method of playing and the rules are the same in three-handed and four-handed as in two-handed cribbage, but more care is required, the greater the number of players. The board for four-handed is like that for two-handed cribbage. The counting is done by one player on each side, and neither of the others may touch the pegs.

Skill in Cribbage is shown both in laying out, or discarding, for the Crib, and in playing the cards. In the former the player must bear in mind to whom the Crib belongs. If it were his own he would not object to discarding a pair or a fifteen,

whereas if it were his opponent's he would probably prefer to spoil his own hand rather than to give his enemy an advantage unless he were very far ahead. In Five-card Cribbage it is considered of more importance to "balk" or spoil an opponent's Crib, than to keep good cards for one's own hand, since the Crib is larger than either hand. As regards sequences a player should avoid discarding close cards for his opponent's Crib, and choose them for his own. It is a good plan to retain a sequence in hand if possible, as there is a good chance of the turn-up card's making it a double sequence.

In playing, the best card to lead is one below a Five, as the adversary cannot then make fifteen. A good player frequently declines to make a pair or small sequence, suspecting that his opponent desires him to do so that he may then make a pair royal, or larger sequence. For the same reason, if it is possible to make either fifteen or a pair the former should be chosen. Numbers which would enable the adversary to make fifteen and a pair, or a thirty-one and a pair, at the same time, should be avoided. Thus a player should never count fourteen or thirty with an Ace, thirteen or twenty-nine with a Two, twelve or twenty-eight with a Three, and so on.

In counting the hand, beginners often overlook points. They should therefore look over the hand systematically, taking fifteens first, for instance, sequences next, and then, in order, pairs, flushes, and nob.

RULES OF THE GAME.

1. The player who cuts the lowest card deals, Ace counting as low.
2. There must be a fresh cut for deal after each game, unless a rubber is to be played, when the deal alternates throughout the rubber.
3. The cards must be dealt one at a time. If two are dealt at once, the dealer may correct his mistake, if he

can do so by moving only one card, otherwise there must be a new deal.

4. If the dealer expose one of his adversary's cards, or give either too few or too many cards, the adversary may take two points and call for a fresh deal, but he must do so before looking at his hand. Except that if too few cards have been given the non-dealer, he, after looking at his hand, may ask to have it completed, instead of demanding a new deal.

5. If a player deal out of turn, and the error is discovered before the trump is turned, there must be a new deal by the proper person, but if the trump has been turned the deal is good. The one who should have dealt deals next, and so on alternately as if no mistake had been made.

6. The dealer may insist on his adversary discarding first.

7. If a player discard, having too many cards, his adversary may score two, and either call for a new deal or draw the surplus card from his opponent's hand.

8. If a player discard, having too few cards, he must play out the hand with the number he has.

9. If a player take back a discarded card, his opponent may score two and call for a new deal.

10. The Crib must not be touched during play.

11. If the dealer turn up more than one card for trump, the non-dealer may take his choice of them.

12. If the dealer turn up a Knave, and neglect to score for "his heels" before he has played, he loses the two points.

13. No card that is properly played can be taken up again, but if one is laid down, making the count more than 31, it must be taken back, and there is no penalty.

14. If a player say "Go" when he has a card that can be played, his opponent may require it to be played, or mark two points.

15. In reckoning, a player's Hand or Crib must remain in full sight till

his opponent is satisfied that the count is correct.

16. If a player score too much, the adversary may correct him and add the same amount to his own score. If he score too little, the adversary is not bound to correct him.

17. A player's pegs must not be touched by his opponent, except to correct a false score; nor by himself, except in scoring. If he displace his foremost peg he must put it behind the other.

18. When a player has quitted his peg, he cannot alter his score.

CRICKET, a game of ball, played usually by 22 persons, 11 on each side. It is played on a field arranged as in the diagrams below. Two "wickets" are set up, 22 yards apart, each consisting of three upright sticks called stumps, 27 inches high, so close together that the ball cannot pass between them. Across the top

generally decided by lot, and the game is then begun by the players of the side that has the field taking positions round the wickets, while two of the other side take position one in front of each wicket, inside the Popping Crease, with bats like those in the illustration. The duty of each of these players, who are called Batters, is to keep himself from being put out as explained below, and to make as many runs as possible.

The players on the fielding side take whatever positions in the field their captain directs. There are always a Bowler and a Wicket Keeper, but the positions of the other men vary with the opinions of the captain and the changes of the bowling. The first diagram shows an arrangement of the field for fast bowling and the

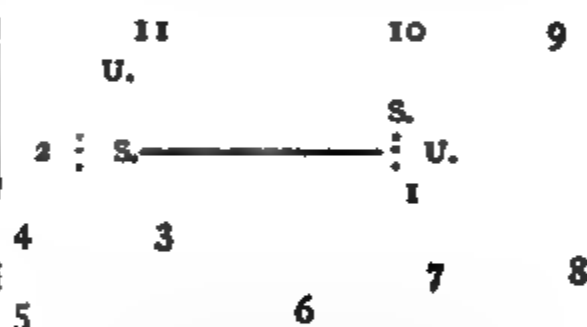


Fig. 1.—Field for Fast Bowling.

S. S., Strikers; U. U., Umpires; 1, Bowler; 2, Wicket-keeper; 3, Point; 4, Slip; 5, Third man up; 6, Cover point; 7, Mid-off; 8, Long-off; 9, Long-on; 10, Mid-on; 11, Short-leg.

1. Pad. 2. Wicket. 3. Bat.
Cricket Implements.

of each wicket are placed two pieces of wood called bails. In front of each wicket and 4 feet from it is a line marked on the ground called a Popping Crease, and in line with each wicket is a Bowling Crease similarly marked, 6 feet 8 inches long, having at its end short lines at right angles to it called Return Creases. The choice of innings is

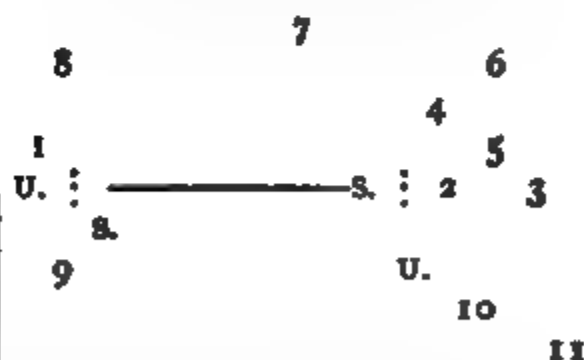


Fig. 2.—Field for Slow Bowling.

S. S., Strikers; U. U., Umpires; 1, Bowler; 2, Wicket-keeper; 3, Longstop; 4, Point; 5, Slip; 6, Cover slip; 7, Cover point; 8, Mid-off; 9, Mid-on; 10, Short leg; 11, Long leg.

second one for slow bowling. The names of the various positions in which the captain distributes his

men, as he deems most advantageous, vary slightly in different places, but are usually those given in the diagrams of the field inserted below.

The Bowler begins play by delivering the ball at the opposite wicket, standing with one foot behind the Bowling Crease. The Batter tries to protect the wicket by striking the ball with his bat. If the ball neither is struck nor hits the wicket, the Wicket Keeper returns it to the Bowler. If any part of the wicket is knocked down, the Batter is "out," and another takes his place, and so on in an order decided on by the captain of the batting side. If the player strike the ball far enough he may run to the opposite wicket, changing places with the batsman there, who runs at the same time with him. If the two cross the popping creases of the wickets toward which they run, or put the bat inside them before either wicket is knocked down (either by the ball thrown by a fielder or by a fielder with the ball in hand), they together score one run. Otherwise the one who leaves the knocked-down wicket is out, unless they have crossed, when he who approaches it is out. The players may make as many runs as they can, crossing to and fro several times, and scoring one for each run. A player who is out takes no farther part in the game until all on his side are out. The side wins which makes the greater number of runs in two innings, or sometimes in one inning, if it be so agreed. An inning is completed when both sides have been at the bat and have been put out. When the Bowler has bowled a certain number of balls (generally five in England and Canada, and six in the United States) at one wicket, the Umpire calls "over," and the next "over" is bowled at the opposite wicket, the fielders all changing their places correspondingly.

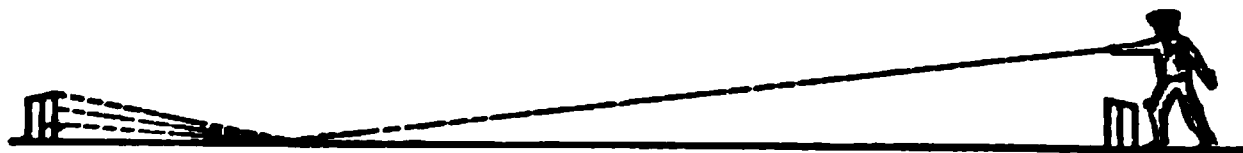
Besides the ways of putting out the Batter that have been mentioned he may be put out by a fielder's

catching and holding the batted ball before it strikes the ground, by his knocking down his own wicket, when in the act of playing the ball, stopping the ball with his body, or in other ways described in the rules below. The batsman and wicket keeper, when playing against fast bowling, generally have the legs protected by guards, and wear buckskin gloves. The size of the bats and ball is regulated by the first and second rules below. The duties of some of the players will now be described in detail.

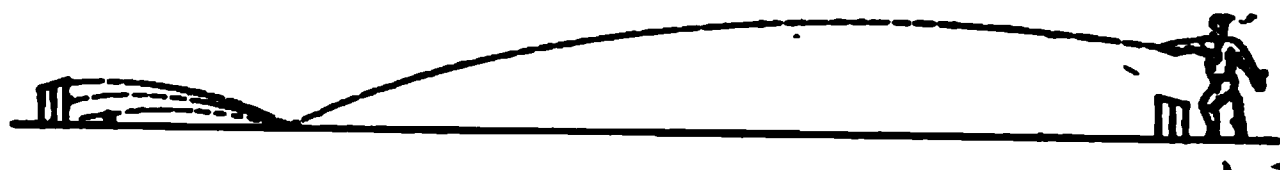
The Bowler. The Bowler is the most important player on the field. He sometimes varies his balls, like the Pitcher in BASE BALL, delivering some fast, some slow, some with one twist and some with another, so as to puzzle the batter. But as a rule a fast or slow Bowler will stick to his particular style, as his field is set for that style only, and a change of even one ball might prove expensive. The figure shows the courses of the balls as delivered by different bowlers. The ball usually bounds once, and the place where it bounds is called the "Pitch." If the ball is pitched close to the batsman, it is called "full pitched"; if it pitches sooner than a full pitched ball it is "short pitched," and if later, "over-pitched." A ball that does not hit the ground before reaching the batsman is called a "full ball." A short pitched ball, reaching the wicket by a long bound, is a "long hop"; an over-pitched ball, which can be hit back or "driven," is a "half volley"; one that strikes the ground just where the batsman's bat is, is a "Yorker," and one which keeps close to the ground after it pitches, is a "shooter." One which bounds several times is a "groundner" or "sneaker." Groundners and full balls are too easily played by good batsmen to be used often, but are sometimes effective. If the bowling be fast, the ball will move in almost a straight line from the Bowler's hand

to the Pitch; if slow, in more or less of a curve. In underhand bowling, formerly more used than now, the ball rises from the Bowler's hand in a very decided curve. This is called "lobbing." The different twists

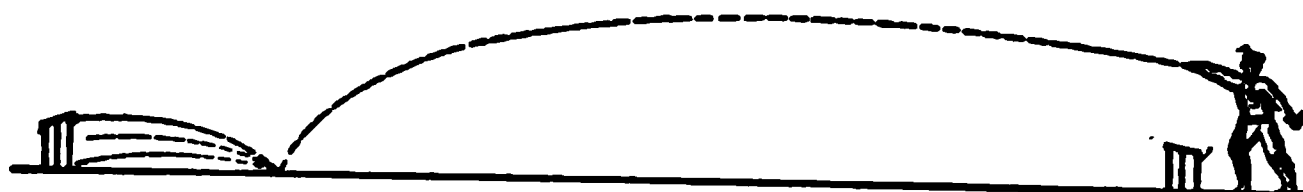
given the ball make it bound high or low or to one side as the Bowler may wish, the ball rolling slightly on the ground during the instant it touches it, and so varying its direction as it rises. The Bowler suits his balls to



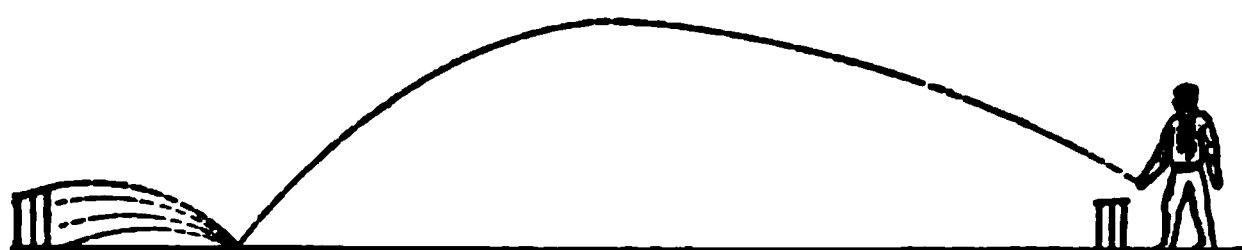
Fast Round-arm.



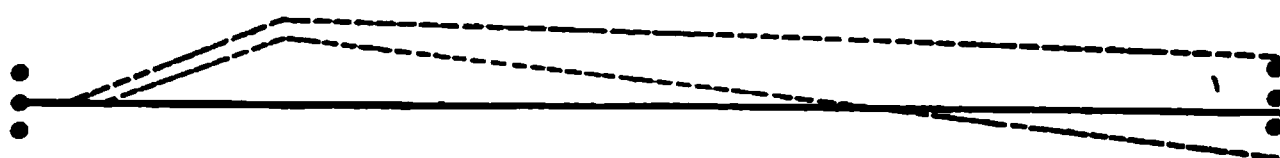
Medium Pace.



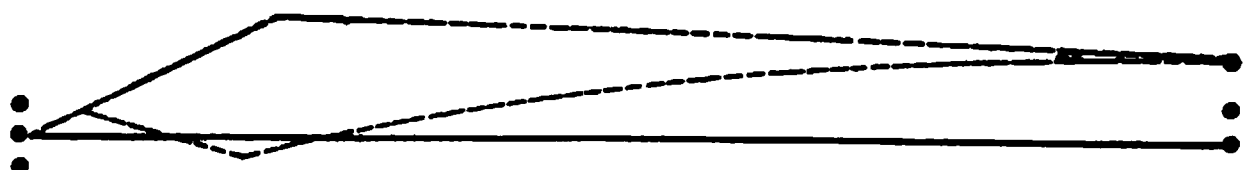
Slow Round-arm.



Low Underhand (Lobs).



Break in from Leg.



Screw Ball.

Different Kinds of Bowling.

the Batsman, trying to give him those hardest for him to play. He should hold the ball with his fingers, not in the hollow of the hand, take a short run before delivering the ball, and "pitch" it as near to the Bats-

man as the latter's style of hitting will allow. If the Bowler send the ball outside the limits of the opposite Bowling Crease, it is a "wide ball"; if he does not follow the rules in delivering it, it is "no ball," and in

either of these cases, when the umpire so calls it, at least one run is scored for the opposite side (see Rule 13). After an "over" has been bowled by one player another Bowler takes his turn. Sometimes

than a few inches apart. Before the Bowler delivers the ball the Batter should "take guard," as in the illustration. The stump nearest the Batter is called the "leg stump," the other outside one the "off stump," and the third the "middle stump." If the Batter hold his bat directly before the middle stump, he is said to "take middle," if in front of both the middle and leg stumps, to "take middle and leg" for guard. The bat should be held about three inches inside the popping crease. The right or "pivot" foot should be placed as near as possible to the wicket without being in the way of any part of it. The object of thus taking guard is to find out where to place the feet so as best to guard the wicket with the bat.

As the Bowler begins to run before delivering the ball, the Batter straightens himself, raising his bat slightly, and when the ball is delivered he draws the bat back to the bails of the wicket, where he holds it till he is ready to strike. If he lean slightly toward the wicket, in striking, he is said to "play back," while if he lean toward the ball he "plays forward." In general the former is better, especially for learners, as it gives a longer time to see the ball. The skillful Batter plays forward or

The Bowler.

the same player acts as Bowler and Wicket Keeper alternately. If an "over" is bowled without a run being made, it is called a "maiden over" or "maiden." Besides delivering the ball, it is also the Bowler's place to watch for chances to put the Batsman out at the wicket near which he stands.

The Batter. The Batter wears leg pads and gloves, both of which should fit easily. He should select a bat to suit his size, and should practice with the same one with which he intends to play in a match. Heavy bats send the ball farther than light ones, when given the same speed, but as it requires greater strength to give them that speed, the Batter, when in doubt as to weight, should choose the lighter of two bats. The Batsman should stand easily, with his two heels not more

Taking Guard.

back according to the way in which the Bowler gives him the ball, and the beginner can best learn by experience which to do in any case. In general, he should so bend his

body that the bat strikes the ball about one-fourth the length of the blade from its end; that is, in the thickest part. When the Batsman "has command of the pitch," that is, can nearly reach with his bat (held straight) the spot where the

of the Bowler's hand. He may get a start by beginning to run as soon as the ball is delivered, but should not go so far that he cannot return in time to save his wicket if no hit is made. Neither need run unless he wishes, but if one runs the other must, otherwise a wicket would be left unguarded. It is best for the Batter to decide whether to run, when the ball is hit in front of the wicket, and for his partner to decide when the hit is behind the wicket.

The Wicket Keeper.

This player always wears leg pads and gloves. He stands in a stooping position behind the wicket, varying his distance from

Preparing for Action.

ball bounds, he should play forward, always holding the bat close to the ground, so that the ball will not go underneath as it rises from the bound. The reason for playing such balls forward is that any twist the Bowler may have given the ball, that it may bound in an unexpected direction, has not time to act. The hits which a Batter may make are given different names, according to the direction and manner of striking the ball. If it is hit toward "Point," "Cover Point," or into the "Slips," it is a "cut"; if it is hit forward on the "half volley" it is a "drive"; if it is hit to the "on side" back of the wickets, it is a "leg hit," and if it is sent in this direction by allowing the ball to hit the bat, it is a "draw."

The Batter at the opposite wicket should be ready to run, but must be careful not to do so till the ball is out

it according to the swiftness of the bowling, but he must not stand over it, or with hand or foot in front of it, till the ball has passed the wicket or been struck. After that he may stand where he chooses, but if the Batsmen are running he should

Playing Forward.

so stand that the ball will be thrown in to him over the wicket, which he will thus be able to put down without turning around. He should also be on the watch for a chance to put down the wicket when the Batter is not on his ground (called "stumping out"). As soon as he receives the

ball from the Bowler he should return it easily. If the Wicket Keeper allow a ball that has not hit the bat to pass him, and so give the Batsman a chance to make a run, such a run is called a "bye." If the ball hit the Batsman's person (not his bat or hand) and he make a run, it is a "leg bye." As the Wicket Keeper has a better view of the field and the ball than any other player, he is generally the captain of the team, and directs, or communicates with the other Fielders and the Bowler, by a system of signs previously agreed upon.

Point is the most important of the remaining fielders, as he has more chances for catches than the others. In case of a hit he often "backs up" the Wicket Keeper, or, if it is a long one, runs out toward the fielder nearest the ball, in case there should be a short throw.

The duty of the Long Stop is principally to prevent byes. When

other chance of putting it down quickly. Of late years owing to the increasing skill of Wicket Keepers, the custom of playing a man in this position has been almost entirely given up, the extra man thus gained being used elsewhere. The posi-

Playing Back.

tions of all the fielders are varied by the captain in many ways to suit different styles of bowling and striking, so that the field looks quite differently at one time and another. Only the Bowler, Wicket Keeper, and Long Stop keep about the same places. These changes of position are directed by signs from the captain.

Scoring. A sample score card is given on pages 220-221.

The runs are kept by making opposite the player's name marks which are summed up in the "Total" column after he is out. Abbreviations often used in the "Out" column and elsewhere in the score are :

b.	bowled
c.	caught
st.	stumped
l.b.w.	leg before wicket
h.w.	hit wicket
w.	wides
n.b.	no balls
B.	byes
l.b.	leg byes

The runs made or allowed for Wides, No Balls, Byes; and Leg Byes are kept separately at the

The Out.

the Batsmen are not running he returns the ball to the Wicket Keeper, but in case of a run he sometimes throws to the Bowler in hope of putting a man out at the opposite wicket. Sometimes he throws directly at the nearest wicket, where there is no

bottom of the score, and added to the Grand Total for the innings. In the Out column the name of the person who put the Batsman out is always mentioned, and if he was caught out, the Bowler's name is also

Maidens can be counted up more quickly in running the eye over the record. The following are the rules of Cricket as adopted by the Marylebone Cricket Club of London, they contain the latest revisions and the famous alterations of 1889.

The M. C. C. rules govern the play of all matches in England and Australia. In the United States they are generally followed except that six balls instead of five are bowled to the Over. The Cricketers' Association of the United States has adopted certain modifications of the M. C. C. rules, but in no case are the changes of much importance.

1. A match is played between two sides of eleven players each, unless otherwise agreed to; each side has two innings, taken alternately, except in the case provided for in Law 53. The choice of innings shall be decided by tossing.

2. The score shall be reckoned by runs. A run is scored:—1. So often as the Batsmen after a hit, or at any time while the ball is in play, shall have crossed, and made good their

Leg Hit.

put down, since his bowling contributed to the result.

The right half of the score card consists of a Bowling Analysis, which is made as follows: opposite the name of each Bowler a record is kept of each of his balls. If it results in neither a run nor in putting down a wicket it is recorded by a dot; If runs are made from a ball, the number of such runs appear in place of the dot. If a wicket is put down, the letter W is put in place of a dot. "Wides" and "No balls" are kept record of by themselves and all are footed up at the close of each inning. Thus a "Maiden Over" appears thus—::: or (::: if only five balls are allowed). An Over where two runs were made from the second ball and none from the third would be : 2 : on the record. If the last ball put down the wicket, it would be shown by the mark : : W. Sometimes, in case of a Maiden Over, the letter M is made by joining the dots, so that

Wicket Keeper.

ground, from end to end. 2. For penalties under Laws 16, 34, 41, and allowances under 44. Any run or runs so scored shall be duly recorded by scorers appointed for the purpose. The side which scores the greatest

number of runs wins the match. No match is won unless played out or given up except in the case provided in Law 45.

3. Before the commencement of the match two umpires shall be appointed, one for each end.

4. The ball shall weigh not less than five ounces and a half nor more than five ounces and three-quarters. It shall measure not less than nine inches nor more than nine inches and one quarter in circumference. At the beginning of each innings either side may demand a new ball.

5. The bat shall not exceed four inches and one-quarter in the widest part; it shall not be more than thirty-eight inches in length.

6. The Wickets shall be pitched opposite and parallel to each other at a distance of twenty-two yards. Each Wicket shall be eight inches in width and consist of three stumps, with two bails upon the top. The stumps shall be of equal and sufficient size to prevent the ball from passing through, twenty-seven inches out of the ground. The bails shall be each four inches in length, and when in position on the top of the stumps shall not project more than half an inch above them. The Wickets shall not be changed during a match, unless the ground between them become unfit for play, and then only by the consent of both sides.

7. The Bowling Crease shall be in a line with the stumps; six feet eight inches in length; the stumps in the center; with a return crease at each end, at right angles behind the Wicket.

8. The Popping Crease shall be marked four feet from the Wicket, parallel to it, and be deemed unlimited in length.

9. The ground shall not be rolled, watered, covered, mown, or beaten during a match, except before the commencement of each inning and of each day's play, when, unless the in-side object, the ground shall be

swept and rolled for not more than ten minutes. This shall not prevent the batsman from beating the ground with his bat nor the batsman nor bowler from using sawdust in order to obtain a proper foothold.

10. The ball must be bowled; if thrown or jerked the umpire shall call "No ball."

11. The bowler shall deliver the ball with one foot on the ground behind the Bowling Crease, and within the Return Crease, otherwise the umpire shall call "No ball."

12. If the bowler shall bowl the ball so high over or so wide of the Wicket that in the opinion of the umpire it is not within reach of the striker, the umpire shall call "Wild ball."

13. The ball shall be bowled in Overs of five balls from each Wicket alternately. When five balls have been bowled, and the ball is finally settled in the bowler's or wicket-keeper's hands, the umpire shall call "Over." Neither a "No ball" nor a "Wide ball" shall be reckoned as one of the "Over."

14. The bowler shall be allowed to change ends as often as he pleases, provided only that he does not bowl two Overs consecutively in one inning.

15. The bowler may require the batsman at the Wicket from which he is bowling to stand on that side of it which he may direct.

16. The striker may hit a "No ball" and whatever runs may result shall be added to his score; but he shall not be out from a "No ball" unless he be run out or break Laws 26, 27, 29, 30. All runs from a "No ball" otherwise than from the bat shall be scored "No balls," and if no run be made, one run shall be added to that score. From a "Wide ball" as many runs as are run shall be added to the score as "Wide balls," and if no run be otherwise obtained one run shall be so added.

17. If the ball not having been called "Wide" or "No ball" pass the

24. Or if with any part of his person he stop the ball, which in the opinion of the umpire at the bowler's Wicket shall have been pitched in a straight line from it to the striker's Wicket and would have hit it: "Leg before Wicket."

25. Or if in playing at the ball he hit down his Wicket with his bat or any part of his person or dress: "Hit Wicket."

26. Or if under pretense of running or otherwise either of the batsmen willfully prevent a ball from being caught: "Obstructing the field."

27. Or if the ball be struck or be stopped by any part of his person and he willfully strike it again, except it be done for the purpose of guarding his Wicket, which he may do with his bat, or any part of his

CARD.

Batting Order	Time		Batsman.	Runs as scored.	How and where put out.	Bowler.	Runs Not taken	Total Runs
	In	Out						
1	10.55	11.00	L. H. Foster	11.00	c. Haller ^{and wicket}	Adams	5	10
2	11.00	11.20	E. H. Smith	11.20	Bowled	Adams	10	10
3	11.20	11.40	Thos. Jacob	11.40	c. Sharp ^{Out}	Baker	6	6
4	11.40	11.40	A. Gunder	11.40	c. Bingham ^{Long leg}	Johnston	20	30
5	11.40	11.40	C. Gayer	11.40	Stumped ^{Long}	Baker	20	30
6	11.40	11.40	Th. Shandley	11.40	Not out	Muller	1	15
7	11.40	11.40	J. Faye	11.40	Not out	Adams	12	22
8	11.40	11.40	E. A. M. Garry	11.40	Not out		4	10
9	11.40	11.40	J. Gurnea	11.40	Leg before wicket	Baker	7	20
10	11.40	11.40	L. De Hatt	11.40	Not out		5	5
11	11.40	11.40	J. T. Hughes	11.40	Not out			
12								

Remarks: 14.5. Submission of 30 minutes for lunch.

Das Landgericht ist 140-133

9 This makes the time for the other circles

P. A. but from a ball, we have agreed on one

note at bot.

By: _____

Low Bay

2004 2005
FF Index

No ball

15. ENL

Total Entries	12
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Total of 2 nd Innings	
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now by _____ by _____

Total for the Match	240
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Run at the fall of each wicket	1	2	3	4	5	6	7	8	9	10	11	Time of innings <i>1 hr 15 min</i> No. of runs <i>200</i> No. of wickets <i>8-90</i>
Order of coming out (by numbers)	<i>5</i>	<i>2</i>	<i>1</i>	<i>5</i>	<i>5</i>	<i>1</i>	<i>7</i>	<i>10</i>	<i>10</i>	<i>10</i>		
	<i>1</i>	<i>3</i>	<i>2</i>	<i>11</i>	<i>1</i>	<i>7</i>	<i>8</i>	<i>9</i>	<i>5</i>	<i>11</i>		

Note: Shag colored (figs 4 & 5) from balls colored as white or as balls are colored as White or No balls and do not enter between's name.

person except his hands: "Hit the ball twice."

Either Batsman is out—

28. If in running or at any other time while the ball is in play he be out of his ground and his Wicket be struck down by the ball after touching any fieldsman, or by the hand or arm with ball in hand of any fieldsman: "Run out."

20. Or if he touch with his hands

or take up the ball while in play, unless at the request of the opposite side: "Handle the ball."

30. Or if he willfully obstruct any fieldman : "Obstructing the field."

31. If the batsmen have crossed each other, he that runs for the Wicket which is put down is out; if they have not crossed, he that has left the Wicket which is put down is

out

32. The striker being caught no run shall be scored. A batsman being run out, that run which was being attempted shall not be scored.

33. A batsman being out from any cause the ball shall be "dead."

34. If a ball in play cannot be found or recovered, any fieldsman may call "Lost ball," when the ball shall be "dead"; six runs shall be added to the score; but if more than six runs have been run before "Lost ball" has been called, as many runs as have been run shall be scored.

35. After the ball shall have been finally settled in the Wicket keeper's or bowler's hand, it shall be dead; but when the bowler is about to deliver the ball, if the batsman at his Wicket be out of his ground before actual delivery, the said bowler may run him out; but if the bowler throw at that Wicket and any run result, it shall be scored "No ball."

36. A batsman shall not retire from his Wicket and return to it to complete his innings after another has been in without the consent of the opposite side.

37. A substitute shall be allowed to field or run between Wickets for any player who may during the match be incapacitated from illness or injury, but for no other reason, except with the consent of the opposite side.

38. In all cases where a substitute shall be allowed, the consent of the opposite side shall be obtained as to the person to act as substitute and the place in the field which he shall take.

38. In case any substitute shall be allowed to run between Wickets the striker may be run out if either he or his substitute be out of his ground. If the striker be out of his ground while the ball is in play, that Wicket which he has left may be put down and the striker given out, although the other batsman may have made good the ground at that end, and the striker and his substitute at the other end.

40. A batsman is liable to be out for any infringement of the laws by his substitute.

41. The fieldsman may stop the ball with any part of his person, but if he willfully stop it otherwise, the ball shall be "dead" and five runs added to the score; whatever runs may have been made five only shall be added.

42. The Wicket keeper shall stand behind the Wicket. If he shall take the ball for the purpose of stumping before it has passed the Wicket, or if he shall incommode the striker by any noise or motion, or if any part of his person be over or before the Wicket the striker shall not be out excepting under Laws 26, 27, 28, 29, and 30.

43. The Umpires are the sole judges of fair or unfair play, of the fitness of the ground, the weather, and the light for play; all disputes shall be determined by them, and if they disagree the actual state of things shall continue.

44. They shall pitch fair Wickets, arrange boundaries where necessary, and the allowances to be made for them, and change ends after each side has had one innings.

45. They shall allow two minutes for each striker to come in and ten minutes between each innings. When they shall call play the side refusing to play shall lose the match.

46. They shall not order a batsman out unless appealed to by the other side.

47. The umpire at the bowler's wicket shall be appealed to before the other umpire in all cases except in those of stumping hit Wicket, run out at the striker's Wicket or arising out of Law 42, but in any case in which an umpire is unable to give a decision he shall appeal to the other umpire whose decision shall be final.

48a. If the umpire at the bowler's end be not satisfied of the absolute fairness of the delivery of any ball he shall call "No ball."

48b. The umpire shall take espe-

cial care to call "No ball" instantly upon delivery: "Wide ball" as soon as it shall have passed the striker.

49. If either batsman run a short run the umpire shall call "One short," and the run shall not be scored.

50. After the umpire has called "Over" the ball is "Dead," but an appeal may be made as to whether either batsman is out; such appeal, however, shall not be made after the delivery of the next ball nor after any cessation of play.

51. No umpire shall be allowed to bet.

52. No umpire shall be changed during a match unless with the consent of both sides except in case of violation of law 51; then either side may dismiss him.

53. The side which goes in second shall follow their innings if they have scored 80 runs less than the opposite side.

54. That on the last day of a match or if a one day match at any time, the in-side shall be empowered to declare the innings at an end.

One Day Matches. 1. The side which goes in second shall follow their innings if they have scored 60 runs less than the opposite side.

2. The match unless played out, shall be decided by the first innings.

3. Prior to the commencement of a match it may be agreed that the over consist of five or six balls.

Single Wicket. A kind of Cricket, which may be played by two or more persons on a side. There is but one Wicket and one striker at a time, and a bowling crease or stump 22 yards in front of the wicket. The laws are, where they apply, the same as the above, with the following alterations and additions.

1. One Wicket shall be pitched as in Law 6 with a bowling stump opposite to it at a distance of twenty-two yards. The bowling crease shall be in a line with the bowling stump and drawn according to Law 7.

2. When there shall be less than

five players on a side bounds shall be placed twenty-two yards each in a line from the off and leg stump.

3. The ball must be hit before the bounds to entitle the striker to a run, which run cannot be obtained unless he touch the bowling stump or crease in a line with his bat, or some part of his person, or go beyond them and return to the popping crease.

4. When the striker shall hit the ball one of his feet must be on the ground behind the popping crease, otherwise the umpire shall call "No hit," and no run shall be scored.

5. When there shall be less than five players on a side neither byes, leg-byes, nor overthrows shall be allowed. nor shall the striker be caught out behind the Wicket nor stumped.

6. The fieldsman must return the ball so that it shall cross the ground between the Wicket and the bowling stump or between the bowling stump and the bounds; the striker may run till the ball be so returned.

7. After the striker shall have made one run, if he start again he must touch the bowling stump or crease and turn before the ball cross the ground to entitle him to another.

8. The striker shall be entitled to three runs for lost ball and the same number for ball willfully stopped by a fieldsman otherwise than with any part of his person.

9. When there shall be more than four players on a side there shall be no bounds. All hits, byes, leg-byes, and overthrows shall then be allowed.

10. There shall be no restriction as to the ball being bowled in overs, but no more than one minute shall be allowed between each ball.

Wicket, a kind of Cricket once much played in parts of the United States. The Wicket is low and broad, the bail being four or five feet long on stumps about six inches high, placed one at each end. The ball is larger and softer than a Cricket ball, and the bat shaped something

like a hockey stick with a large flat end, or a lacrosse stick having its lower end entirely of wood instead of being strung. The method of playing was similar to Cricket. It has not been played much since 1865.

The largest individual scores at Cricket are as follows :

England, 485, A. E. Stoddart, Hempstead, Aug. 4, 1886. Australia, 328 (not out), W. Bruce, Melbourne, Jan. 19 and 26, 1884. Canada, 204, A. Browning, Ottawa, July 1, 1880. United States, 182 (not out), C. S. Farnum, Philadelphia, July 11, 1885.

The largest recorded total scores in one inning are as follows :

British, 920 runs, Orleans Club, Rickling Green, England, Aug. 4-5, 1882.

American, 418, Germantown Club, Philadelphia, June 18 and 28, 1887.

History. Cricket was probably at first a mere game of bat and ball, without the Wicket, and French authors say it was derived from the French *Crosse*, which is also called *Criquet*. The name is probably from the Saxon *Cric*, a crooked stick, referring to the early bats, which were curved, instead of straight as now. In the wardrobe account of King Edward I. for the year 1300, is an item in which is mentioned playing at *Creag*, supposed to have been an early form of Cricket. At first the only players seem to have been batsman and bowler ; fielders appear for the first time in a picture of 1344. In the 15th century the game was called "Hondyn and Hondoute" (Hand in and Hand Out), showing that there was then an In and an Out side. Under this title it was among the games forbidden by Edward IV. in 1477, as interfering with the practice of archery. The first appearance of the present name is in 1593, in a lawsuit about a piece of ground, in which a man testified that he had played "at Crickett" there fifty years before. Early in the 18th century the game became popular,

being played by all classes of people, and in 1751 Frederick, Prince of Wales, died from a hit with a Cricket ball while playing at Cliefden House. It was a favorite especially in the southern counties of England, and matches between players in the different counties began to be held, which have continued to the present day. There are now Cricket clubs in every village in England, and it is known as the national game of that country.

In the early history of cricket, as has been said, the Wicket did not exist. A circular hole was used instead, into which the ball was bowled. The first Wicket consisted of one stump only 18 inches high, then a second was placed two feet from it, and they were connected by a cross-bar. The hole was still retained between the stumps. About 1775 the third stump was added, and the Wicket was gradually made smaller, till in 1817 it reached its present size. The bats were made first with a sweeping curve, the present straight bats coming into use about 1825. The bowling was always underhand till 1785, when round arm or straight arm bowling was introduced. It was declared unfair, but since 1825 has been adopted, and in 1864 all restrictions as to the height of the arm in bowling were removed, causing a revolution in the game, by giving much greater power to the bowler.

In the United States it has been played since the middle of the 18th century, but it has never been popular. The earliest recorded match in this country was between eleven men from London and eleven from New York, and was played on May 1, 1751, where Fulton Market now stands, in New York city. The New Yorkers won. A club was formed in Boston in 1809, and Benjamin Franklin took to Philadelphia from England a copy of "The Laws of Cricket," still in possession of a club in that city. Cricket is now played principally in and about Phil-

adelphia, though there are 150 organized clubs in the United States, and in 1878 the Cricketer's Association of the United States was formed. Base Ball has always been more popular here. Ball players say that Cricket is too slow, since a game generally lasts a whole day or even two days, whereas a ball game is over in a few hours.

Since 1859, English and Australian Cricketers have made several tours in the United States and Canada and have as a rule been victorious. Matches are played annually between the United States and Canada in which the former generally gets the best of it. In 1874 and 1875 a Philadelphia team won a silver cup at Halifax and Philadelphia, respectively, against British and Canadian teams. In 1878 and 1882 Australian teams came to this country and won or drew every match they played; in 1879 two English teams met with similar success, and during this year an Irish team won everywhere except in Philadelphia, where it was badly beaten; but in 1884 a Philadelphia team won eight matches in England, losing five and drawing five. In 1885 a strong English team received, at Philadelphia, the first defeat inflicted on organized English cricketers in this country, but in 1886 another English team won every match they played in the United States. "In 1887 a Canadian team visited Great Britain and played eighteen matches, winning four, losing five, and drawing nine."

"In 1888 an Irish team was successful everywhere in this country except in Philadelphia, where they were twice defeated."

"In 1889 a second Philadelphia team visited Great Britain playing twelve matches, of which it won four, lost three, and drew five." But attempts to arouse general interest in the sport in the United States have met with little success.

CROOKED MAN, a game played by any number of persons, in which

each player jumps from one to another of a series of pictures drawn on a floor or pavement. The pictures illustrate roughly the nursery rhyme:

"There was a crooked man,
He went a crooked mile,
And found a crooked sixpence
Against a crooked stile;
He bought a crooked cat,
Who caught a crooked mouse,
And they all lived together in a little
crooked house."

There are seven pictures, representing the words at the end of each line; that is, a man, a milestone, a sixpence, a stile, a cat, a mouse, and

Crooked Man Diagram.

a house. These are drawn with chalk close together in any desired order, and each is surrounded with a circle. One of the players takes his place in the middle of the group of pictures, and the others sing the rhyme to any well-known tune which can be made to fit it, for instance "John Brown's Body." At the last word of each line he must jump to the corresponding figure. The verse is then repeated, and this time he must jump to the figure just before it is mentioned, giving a second jump at the proper word. While the last line is sung, he must step

from one figure to the other as fast as he can, going over them all, and ending on the last at the last word. If he jumps to a wrong figure, puts his feet outside the circles, turns quite around, or jumps before the proper time, he must pay a forfeit. The players take turn in jumping like the first.

This game is played in a slightly different form by German students.

CROQUET. A lawn game played with mallets and balls, on a field set with nine or ten wire arches or wickets, and two Stakes, generally of wood. An ordinary Croquet set contains eight balls, each of a different color or marked by a different colored ring, and eight mallets, each similarly marked, to correspond with the balls. The two stakes also are painted with rings of the same colors, arranged in the same order.

The arches and stakes are set in various ways, for the most common of which see Fig. 1, in which the unbroken line marks the course of the ball from the starting point to the lower stake, and the dotted line its return path. If played on an unlimited field, as a park, or lawn, the boundary is designated by a white cord fastened to stakes, A, B, C, D. Any ball passing beyond this border may be returned for play to the point where it left the field. The dotted inner border F, G, H, I, represents a line 30 inches from the outer border, and when the field has a fixed border, made by placing boards four or five inches high (not more) on edge around it, balls, having passed to, or over this border, are placed on this inner line for convenience of striking. On grounds without a lawn, this inner line is marked by a slight scratch in the soil. The letters e, e, e, e, represent corner pieces 18 inches long. This style of ground, with fixed border, and field carefully scraped and sanded and rolled, was for many years (till 1889) the standard field of the National Association.

The game may be played by two,

four, six, or eight persons, but two or four make the best game.

Four-handed Croquet is played exactly like the two-handed game, except that each player has but one ball, so that the two balls on one side are played by partners instead of by the same person. In Six

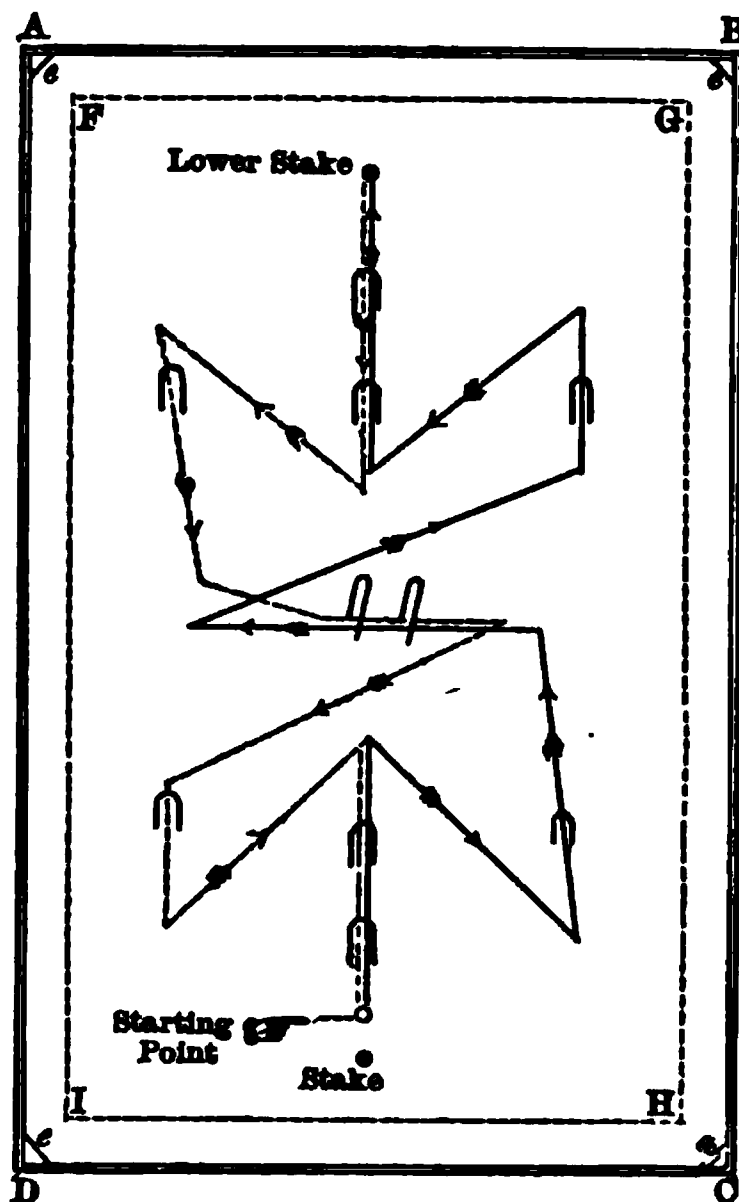


Fig. 1.—Croquet Ground.

and Eight-handed Croquet each player has a ball, and there are two sides as before. The order of play must be decided on before the game is begun and kept the same throughout, no one playing directly after any of his partners. The length of time required for a Six or Eight ball game is such that it is rarely engaged in. When two play, each player uses two balls; when more than two, each player generally has but one ball. In all tournament contests by members of the National Association there are two players, each playing two balls (see *Scientific Croquet* below), but friendly or social games, so

called, have four players, each, of course, using one ball, the first and third, and the second and fourth, being partners. The following description is of the two-handed game.

The players take turns, each using his two balls alternately, in the order of their colors on the stakes. The first play may be decided by lot. Play is begun by placing the ball half-way between the starting stake and the first arch, and striking it with the mallet, generally so that it will pass through the first arch. If, however, the arches are narrow, a good player rarely attempts to make the first arch at the outset, but strikes so as to leave his ball at the lower end of the field, or at some distance from the starting point, preferring to wait till he has all the balls in play and then, by their help, make several arches, as described below. The player's object is to pass through each of the arches in turn, strike the opposite stake, called the turning stake, and then return to the starting stake in like manner, by the path shown in Fig. 1. A ball after having been struck from the starting point is generally regarded "in play," whether such ball has made the first arch or not. Early rules recognized the "booby" as one who attempted, but failed, to make the first arch, but this term is now discarded.

When a player's ball passes through an arch, or hits the lower stake, he is said to "make a point." When his ball, from a stroke of the mallet, hits another, either friend or foe, it is said to "roquet" it. This gives the privilege of roquet-croquet, which *must be taken*, and is done by placing the player's own ball in contact with the roqueted ball, and then striking the former so as to move, however slightly, the roqueted ball and sending his own by the same stroke a greater or less distance as may be desired. After making a point, and also at the beginning of every turn, the player has the privi-

lege of roqueting any ball he may choose, but no ball can be roqueted more than once in any turn unless a point be made. Then the player's ball is said to be "alive" on all the

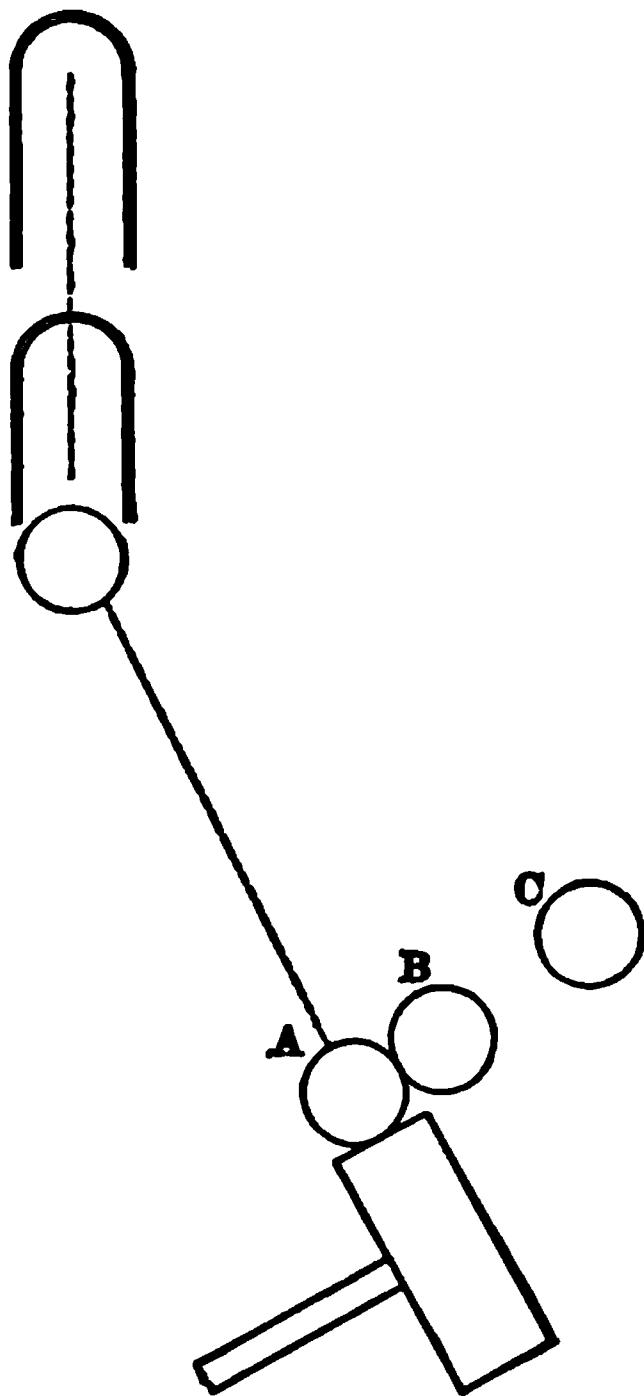


Fig. 2.—Position by Split Shot.

balls, and when he has played on all, he is "dead" on them. There are two ways of taking roquet-croquet. The one above described is called "loose" croquet, because neither ball is held during the stroke. The other is "tight" croquet, when the playing ball is placed against the roqueted ball, and held either between the fingers or by the foot so that when it is struck the object ball moves in any desired direction. If the struck ball moves from the hand or from under the foot, it is called a "flinch" and play ceases. The hand is used upon carefully prepared grounds to prevent the

indentations made by holding a ball firmly under the foot.

The privilege of roquet-croquet, being continued after every point made, enables a skillful player to make several arches, frequently the entire round from start to finish, in one turn. This is called "making a run," in which sometimes only one ball is "used," either his own or his opponent's, but so placed each time beyond the arch to be made that when the playing ball passes through the arch it can use the other to get in front of the next arch (called "getting into position").

In loose Croquet, roquet-croquet may be taken by means of several kinds of strokes, or "shots," so called: "follow shots," in which one ball follows the other more or less closely according to the skill of the player; "split shots" (Figs. 2 and 4), in which they move in different directions, and "slice shots" (see Fig. 3). In Figs. 2 to 6 the player's ball is lettered A and the roqueted ball B, except in Fig. 4, where C shows the direction of the mallet-stroke, and A and B that of the balls respectively. In the "slice shot," the object ball is only slightly displaced or made only

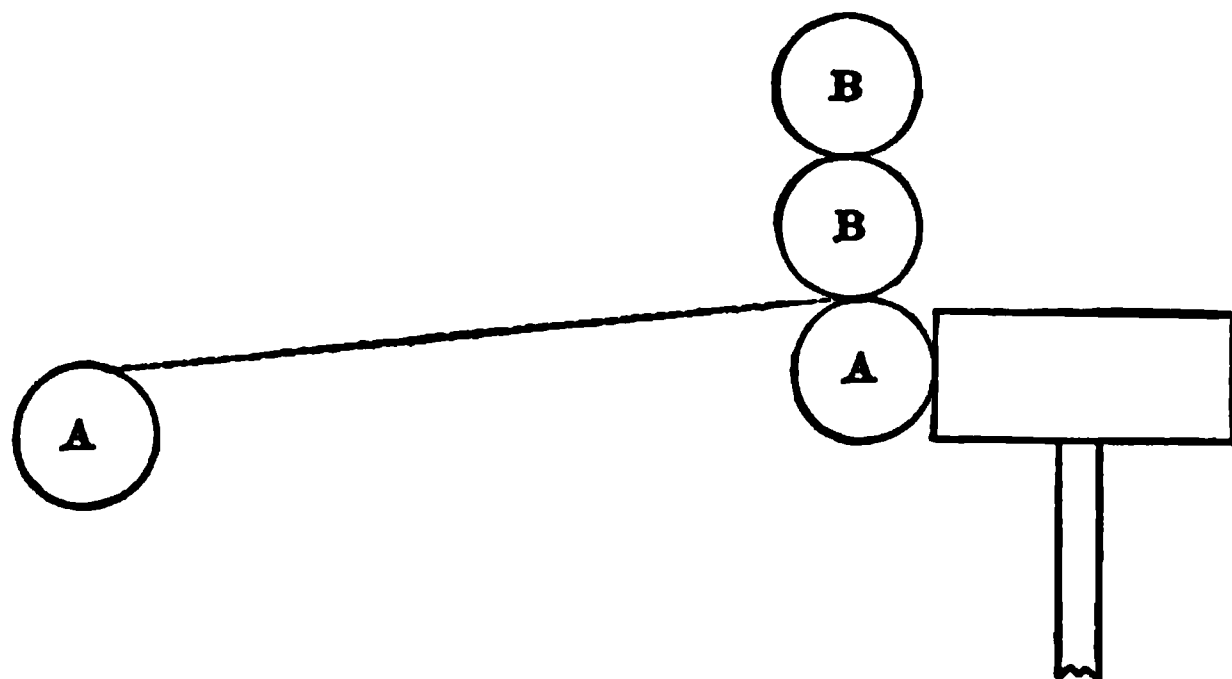


Fig. 3.—Slice Shot.

to *shake*, this latter being deemed sufficient to prevent the player from losing his shot, for if either of these shots be attempted and the object ball *be not moved* play ceases, and the struck ball may be returned or not (according to the wish of the opponent) to the position it had before the stroke. In the follow shot, the balls will roll off together if the stroke be slow and pushing, but if it be sharp and quick, only the object ball will go to any great distance. By varying the direction and speed of stroke, a skillful player can send each of the balls exactly where he wishes them to go.

Many players have one end of their mallets made of soft rubber, by an ordinary stroke of which both balls

will go the whole length of the field together.

When a player's ball has made all the points in the game except striking the finishing stake, it is called a Rover, but remains in the game to assist his other ball till it also becomes a Rover. Rovers can be put out only by partners, and when a Rover is thus made to hit the stake, and his partner, without removing the other ball from the field, fails to hit the stake on the next shot neither is regarded as out. They must go out in successive shots by the same player. A Rover has no additional privilege of play on account of being a Rover.

Suggestions. In Croquet, the skillful player tries to keep his own

balls together as much as possible and to separate those of his opponent. That one of the enemy's balls played last (called the "innocent ball," because it can do no harm till three others have had their turns) can be used and left near either of a player's balls without danger, but the other ball (called the "guilty" or "danger" ball) should either be sent to a distance after it has been used, or so placed that the wire of an arch or a stake will be between it and the other balls. In the latter case it is said to be "wired." Figs. 5 and 6 show two different methods of wiring.

When his ball is wired, a skilled player may, provided the ball be far enough from the wire to allow it, make what is called a "jump shot," by striking the ball downward so that it bounds over the wicket. When no obstruction prevents one ball from hitting another the shot is said to be "open." Bold and confident players, especially in friendly or social contests, frequently take the danger ball with them in making a run, "tying it up," or "wiring" it, just before an attempt to make the difficult center or basket arch (sometimes called also the cage. This style of play is universally adopted by skilled players). A player should not try to roquet the danger ball at all, if by missing it he would give it a better chance for play than it had before. At the end of a play, or at the beginning, when there is little chance of a run, the player should place his ball where it will aid his other ball.

Field and Implements. Croquet is usually played on closely shaven turf, but skilled players prefer a ground of rolled earth, sanded (very slightly) to hold the balls. The size of the field varies from 40 by 60 to 60 by 100 feet, the latter being unnecessarily large; the match games of the National Association are played on fields about 45 by 80 feet. The arches or wickets are often as

wide as 6 or 7 inches, but on the grounds of clubs belonging to the National Association they are only $3\frac{1}{4}$ inches wide, making it difficult for a ball to make its arch unless it be directly in front of it. The wickets are sunk about 6 inches in the ground and usually set in buried blocks of wood to make them more firm. The inside measurements of Fig. 1 are as follows: The stakes are 7 feet from the middle point of the end border, with five arches in a straight line between them, the center one being a double one, formed of two arches placed 18 inches apart and set crosswise of the ground. It is 7 feet from each stake to the first arch, which is 7 feet from the second arch. The side arches are about 14 feet from the second arches nearly or quite at right angles. But in case the field selected should be of different dimensions from those given above, any similar setting of arches, with proportionate distances, will prove satisfactory. [For diagram and construction of grounds adopted in 1889 by the National Association see *Scientific Croquet*.] The mallets

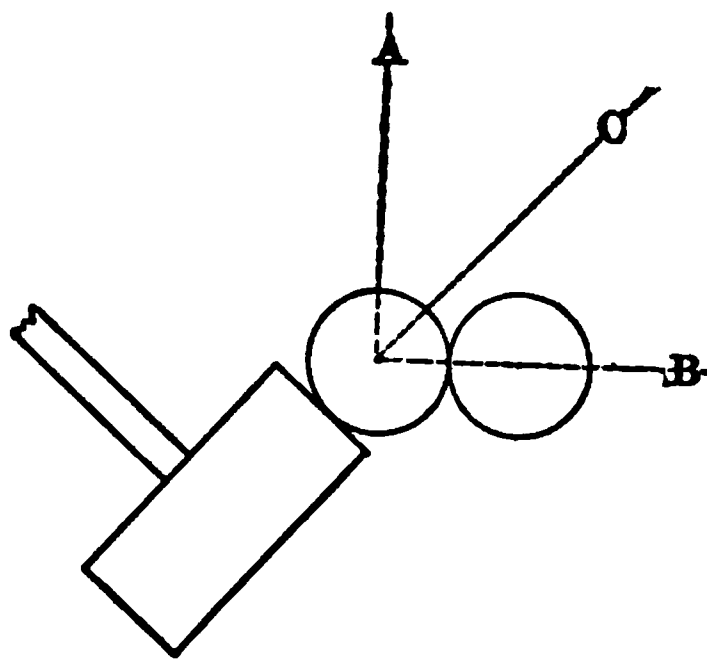


Fig. 4.—Split Shot.

are made in various styles and sizes, and of different materials, according to the owner's taste, there being no restriction in any respect. Those approved by the National Association either have solid heads of box-wood, brass-ringed, 7 to $7\frac{1}{4}$ or 8

inches long by $2\frac{1}{4}$ to $2\frac{1}{2}$ inches in diameter; and handles from 8 to 15 inches long, or have hard rubber ends firmly ringed with brass rings shrunk on, these ends screwing on to a center piece of beautiful wood, into which the handle screws, so as to be readily taken apart for convenience in carrying (see Fig. 7).

Though short-handled mallets like those just described are now pre-

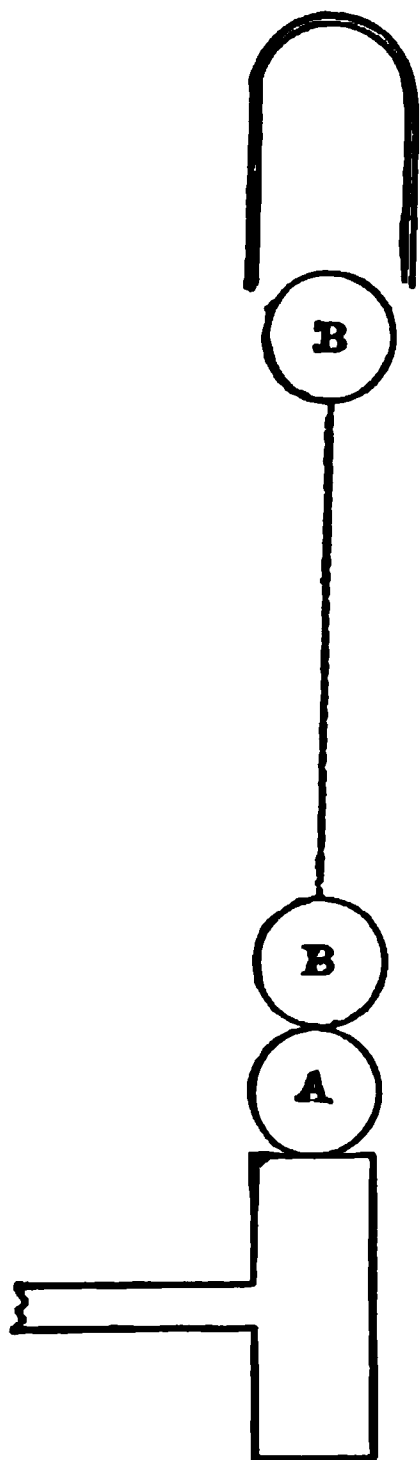


Fig. 5.—Wiring by Direct Roquet Croquet.

ferred by skilled players, the ordinary mallet handles are from 3 to 4 feet long, so that the player may strike his ball without stooping. The ordinary balls are of wood, *lignum vitæ* being the best, but balls of various compositions are used. The

National Association has adopted hard rubber balls, $3\frac{1}{4}$ inches in diameter, so that in passing through a wicket a ball has only one quarter of an inch of spare space, or an eighth of an inch on each side. The colors adopted are the national colors, red, white, and blue, and always in that order, therefore easy to be remembered. The fourth ball is the natural color of the rubber, black, and follows in order; so that red and blue are partners, and black and white their opponents. Metal or wooden spring "clips," so called (patent clothes fasteners are excellent for the purpose), colored to correspond with the balls, are placed on the tops of the arches to determine without dispute the arch through which the ball of corresponding color must next pass.

[Balls and clips can be very easily painted by using a solution of white shellac in alcohol, and mixing with this as wanted, Chinese vermillion for red, Prussian blue with a little zinc white for a light blue, and zinc or flake white for white, painting with separate brushes and mixing colors in separate dishes. Thus painted they will dry in a few minutes and wear for several days.]

Scientific Croquet. As played by experts the game differs from ordinary croquet in many particulars, some of which have been hinted at in the previous description. To be full in all respects, we append the description of the grounds adopted in 1889 by the National Association, and also the rules amended to June, 1890. [Although the grounds, as here described, are those upon which all tournament contests shall be played, some clubs, owing to the expense required to change, still adhere to the style as given in Fig. 1.]

The plan of the ground is as shown in Fig. 8. A full-sized ground is 45 by 80 feet; the ground to be raised two inches at the border, the slope extending thirty inches into

the field, the base of which is the boundary line. The stakes or posts are to be one inch in diameter, and

one and one-half inches high, situated at the base of the rise at the center of the width of the grounds.

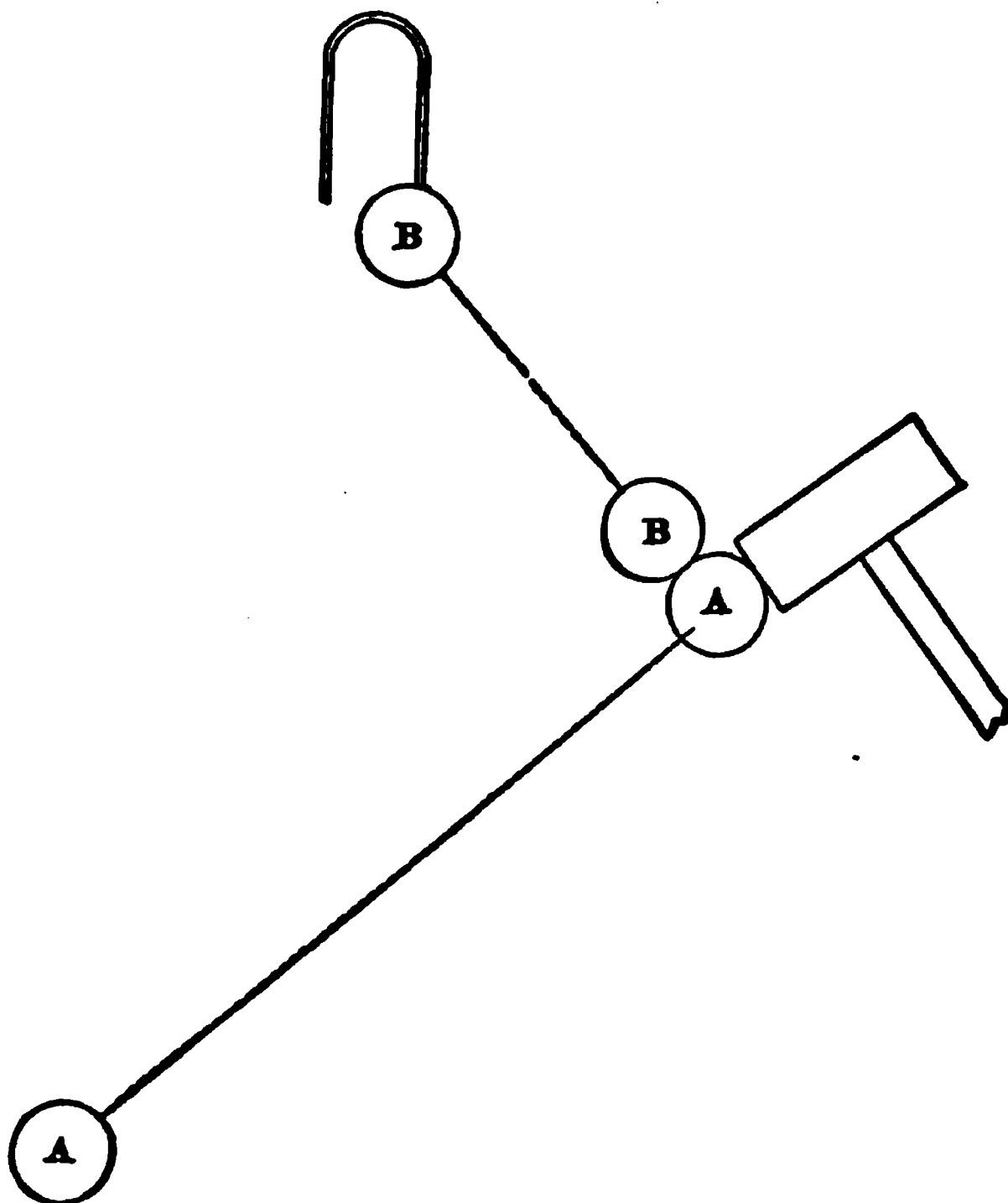


Fig. 6.—Wiring by Split Shot.

The first wicket to be seven feet from the post ; the second seven feet from

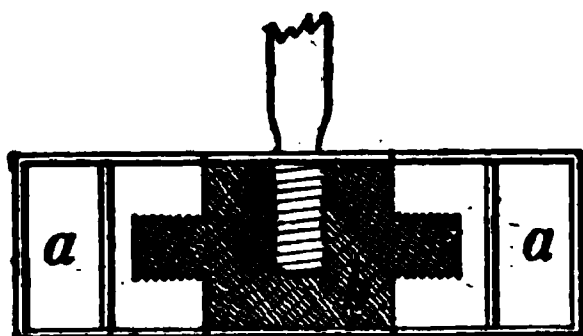


Fig. 7.—*a a*, Brass Rings ; *b*, center piece of wood screwing into the hard rubber ends.

the first, each on a line extending though the middle of the field. The side arches to be five feet from the

foot of the rise on a line with the second arch from each stake ; the cage, or double wicket in the center, to be eighteen inches long and three and three-eighth inches between the wires, and set at right angles with a straight line drawn from stake to stake. The border at the top of the slope is to be made of maple or other hard wood, about four by six inches, laid flat to serve as a cushion, whence caroms can be made. The corner pieces to be of same material and eight feet long, inside measurement. All arches except the center arch to be three and one-half inches in the clear.

In this game four balls make a set, and two or even three games of four balls each, thus accommodating eight or twelve persons, may be played on the same ground, and with but little confusion or interruption, provided one set of balls is

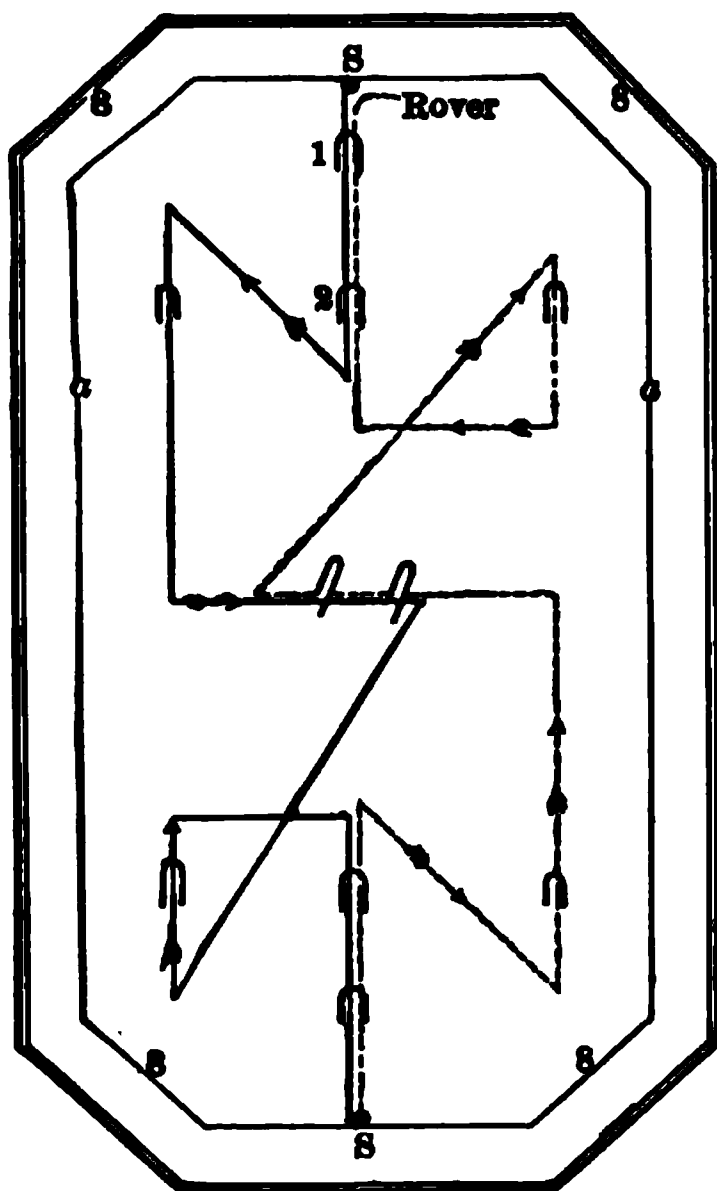


Fig. 8.—S S, Stakes; a a, Boundary; continuous line going, dotted line returning.

colored, another set numbered, and the third marked with rings to distinguish the sets and the players. This is frequently done in the Western States, where the grounds are covered, and play is enjoyed regardless of cold or storm outside.

RULES OF THE GAME.

The following are the rules adopted by the National Croquet Association of America:

1. *Interfering with Players.* No player or other person shall be permitted to interfere with the result of a game by any word or act calculated to embarrass the player, nor

shall any one except a partner speak to a player while in the act of striking.

2. *Order of Colors.* The order of colors shall be Red, White, Blue, Black.

3. *Mallets.* There shall be no restriction as to kind or size of mallet used—one or two hands may be used in striking.

4. No player shall change his mallet during a game without permission of his opponent, except in case of accident, or to make a "jump shot."

5. Should a ball or mallet break in striking, the player may demand another stroke, with a new ball or mallet.

6. *Clips or Markers.* Every player shall be provided with a clip or indicator of the same color as his ball, painted on one side only, which he must affix to his arch next in order in course of play, before his partner plays, with the painted side toward the front of the arch. Should he fail to do so his clip must remain upon the arch it rested on before he played, and he must make the points again. Should he move his marker beyond or back of the point he is for, his attention must be called to such error before he plays again, otherwise it shall stand. Should a player put a ball through its arch, he must move the corresponding clip to its proper arch before the next ball is played, otherwise the clip remains as before.

7. *Opening of Game.* All games shall be opened by scoring from an imaginary line through the middle wicket and playing toward the turning stake. The balls must be so played that they rest below the first arch from the turning stake, and if dislodged, must be replaced—all balls being in play from where they rest, the ball nearest the stake playing first.

8. *Balls—How Struck.* The ball must be struck with the face of the mallet, the stroke being delivered

whenever touching the ball it moves it. Should a stake or wire intervene, the stroke is not allowed, unless the ball is struck at the same time, and if the ball is moved, without being struck by the face of the mallet, it shall remain where it rests, and should a point (or roquet) be made, it shall not be allowed, except by the decision of the umpire as to the fairness of the shot. All balls moved by a foul shot may be replaced or not at the option of the opponent.

9. When making a direct shot (i. e. roquet) the player must not push or follow the ball with his mallet; but when taking croquet from a ball (two balls being in contact), he may follow his ball with the mallet; but must not strike it twice.

10. If a player strikes his ball before his opponent has finished his play, the stroke shall stand, or be made over, at the option of the opponent.

11. Should a ball rest against or near a wire, and the umpire or other person agreed on should decide that in order to pass through the arch, an unfair or push shot must be made, it shall not be allowed if made.

12. *Foul Stroke.* Should a player in making a stroke move with his mallet any other than his object ball, it shall be a foul, and his play ceases, and all balls moved shall be replaced as before the stroke or remain where they rest, at the option of the opponent.

13. If a dead ball, in contact with another ball, moves on account of the inequality of the ground, while playing the other ball, away from it, the player does not lose his shot.

14. *Balls—When not to be Touched.* A ball must not be touched while on the field, except after a roquet, when it is necessary to place it beside the roqueted ball for the purpose of croquet, or to replace it when it has been moved by accident—except by permission of the opponent.

15. *Roquet and Croquet.* A ball roquets another when it comes in contact with it by a blow from the player's mallet, or rebounds from a wicket or a stake; the border also when it comes in contact with it when croquet is taken from another ball.

16. A player after making a roquet shall not stop his ball for the purpose of preventing its hitting another. Should he do so his play ceases, and all balls shall be replaced as before the stroke, or remain, at the option of the opponent.

17. Roquet gives to the player the privilege of croquet only, and play must be made from the roqueted ball.

18. If a player in taking a croquet from a ball fails to move it, such stroke ends his play, and his ball must be returned, or left where it stops, at the option of the opponent.

19. A player, in each turn of play, is at liberty to roquet any ball on the ground once only before making a point.

20. Should a player croquet a ball he has not roqueted, he loses his turn, and all balls moved by such play must be replaced to the satisfaction of the umpire, or adversary. Should the mistake not be discovered before the player has made another stroke, the play shall be valid, and the player continue his play.

21. In taking croquet from a ball, if player's ball strikes another to which he is "dead," such stroke does not end his play.

22. If a player roquets two or more balls at the same stroke, only the first can be roqueted.

23. *Making of Points.* A player makes a point in the game when his ball *makes* an arch or hits a stake in proper play.

24. If a player makes a point, and afterwards at the same stroke roquets a ball, he must take the point, and use the ball. If the roqueted ball is beyond the arch, as determined by Rule 45, and playing ball rests through

the arch, the arch is held to be first made. [*Note.* While this is not mathematically correct, the rule is so made to avoid disputes and difficult measurements.]

25. If a ball roquets another, and afterwards at the same stroke makes a point, it must take the ball and reject the point. (See note to Rule 24.)

26. A player continues to play so long as he makes a point in the game, or roquets another ball to which he is in play.

27. A ball making two or more points at the same stroke, has only the same privilege as if it made but one.

28. Should a ball be driven through its arch, or against its stake by croquet or concussion, it is a point made by that ball, except it be a Rover.

29. *Playing on Dead Ball.* If a player play by direct shot on a dead ball, all balls displaced by such shot shall be replaced in their former position, and the player's ball placed against the dead ball on the side from which it came; or all balls shall rest where they lie, at the option of the opponent.

30. If a player, in making a direct shot, strike a ball on which he has already played, i. e. a dead ball, his play ceases. Any point, or part of a point or ball struck, after striking the dead ball, is not allowed. And both balls must be replaced in accordance with the preceding rule. A dead ball displaced by other than direct shot shall not be replaced.

31. If playing ball in passing through its arch strike a dead ball that is beyond the arch, as determined by Rule 45, the ball shall not be considered a dead ball if playing ball rests through its arch, and the point shall be allowed.

32. *Balls Moved or Interfered with by Accident or Design.* A ball accidentally displaced, otherwise than as provided for in Rule 12, must be returned to its position before play can proceed.

33. If a ball is stopped or diverted from its course by an opponent, the player may repeat the shot or not as he chooses. Should he decline to repeat the shot, the ball must remain where it stops, and, if playing ball, must play from there.

34. If a ball is stopped or diverted from its course by a player, or his partner, the opponent may demand a repetition of the shot if he chooses—Should he decline to do so, the ball must remain where it stops, and, if playing ball, must play from there.

35. If a ball, while rolling, is stopped or diverted from its course by any object inside the ground, not pertaining to the game or ground, other than provided for in Rules 33 and 34, the shot may be repeated or allowed to remain at the option of the player. If not repeated the ball must remain where it stops, and, if playing ball, play from there.

36. *Balls in Contact.* Should a player, on commencing his play, find his ball in contact with another, he may hit his own as he likes, and then has subsequent privileges the same as though the balls were separated an inch or more.

Concerning Boundary. [The boundary is a line extending around the field, usually thirty inches from the border and parallel with it.]

37. A ball shot over boundary line or border must be returned at right angles from where it stops before play can proceed.

38. A ball is in the field, only when the whole ball is within the boundary line.

39. No play is allowed from beyond the boundary line, except when a ball is placed in contact with another for the purpose of croquet.

40. If a player strikes his ball when over the boundary line, he shall lose his stroke and the balls shall be replaced or left where they stop, at the option of the opponent.

41. If a player roquet a ball off the field by a direct shot his play ceases, and the roqueted ball is placed on the

boundary opposite the point where it lay before being thus hit. But if a ball off the field is hit from a croquet the hit shall not be allowed, the ball shall be properly replaced in the field, and the play shall not cease.

[The three following rules apply to grounds square-cornered and without slope.]

42. The first ball driven over the boundary line into a corner must be placed on the corner at the intersection of the two boundary lines.

43. If a ball, having been struck over the boundary line, is returnable at the corner, another ball being on or entitled to the corner, it shall be placed on that side of the corner on which it went off.

44. If two balls, having been shot over the boundary line, rest directly behind one another at right angles with boundary line, they shall be placed on the line alongside of each other in the direction from whence they were played off. This can occur only when the centers of the two balls rest directly behind one another at right angles with the boundary line.

45. *Ball—When Through an Arch.* A ball is not through an arch when a straight edge, laid across the two wires on the side from whence the ball come, touches the ball without moving the arch.

46. *Balls—When in Position.* If a ball has been placed under an arch, for the purpose of croquet, it is not in position to run that arch.

47. If a ball be driven under its arch from the wrong direction, and rests there, it is not in position to run that arch in the right direction.

48. If a ball shot through its arch in the right direction, rolls back through or under that arch, the point is not made, but the ball is in position if left there.

49. *Hitting Ball while Making Wicket.* The cage wickets may be made in one, two, or more turns, provided the ball stops within limit of the cage.

50. Any playing ball within, or under, a wicket, becomes dead to advancement through the wicket from that position, if it comes in contact with any other ball by a direct shot.

51. *Rovers.* A Rover has the right of roquet and croquet on every other ball once during each turn of play, and is subject to roquet and croquet by any ball in play.

52. Rovers must be continued in the game until partners become Rovers, and go out successively, and a Rover that has been driven against the stake cannot be removed to make way for the next Rover.

53. *Playing Out of Turn, or Wrong Ball.* If a player plays out of his proper turn, whether with his own or any other ball, or in his proper turn plays the wrong ball, and the mistake is discovered before the next player has commenced his play, all benefit from any point or points made is lost, and his turn of play forfeited. All balls moved by the misplay must be returned to their former position by the umpire or adversary. If the mistake is not discovered until after the next player has made his first stroke, the error must stand.

54. *Points Remade.* If a player makes a point he has already made, his marker not being on that point, and the mistake is discovered before the proper point is made, the play ceases with the shot by which the wicket was remade, and the marker remains where it stood at the beginning of this play. All balls shall be left in the position they had at the time the wicket was remade. If not discovered before the proper point is made, the points so made are good, and play proceeds the same as if no error had been made.

55. *Error in Order of Play.* If any error in order is discovered after a player has struck his ball, he shall be allowed to finish his play provided he is playing in the regular sequence of his partner's ball last played. In case of dispute as to proper sequence

of balls, it shall be decided by the umpire ; if there is no umpire, by lot. No recourse shall be had to lot unless each party expresses the belief that the other is wrong.

56. At any time any error in order is discovered, the opposite side shall follow with the same ball last played (the proper sequence); but before playing, their opponents shall have privilege to demand a transposition of adversaries' balls.

Example. Black plays by mistake after Red—the error is not discovered—Blue plays in the proper sequence of his partner Red, and seeing that Black has just played, is thus led to believe it the innocent ball, and upon concluding his play leaves Black by Red. Now if error in order is discovered the player of Red and Blue can demand that the position of Black and White be transposed.

57. *Changing Surface of Ground.* The surface of grounds shall not be changed during a game by either player, unless by consent of the umpire, and if so changed at the time of playing the shot shall be declared lost.

58. *Direction through Wickets.* In making all side or corner arches, the playing ball shall pass through them toward the center.

59. *Penalty.* If a rule is violated, a penalty for which has not been provided, the player shall cease his play.

TERMS USED IN CROQUET.

To Roquet. To hit with one's own ball another ball for the first time.

To Croquet. To place player's ball against the roquetted ball and then striking his own ball, moving both.

In Play. A ball is in play so long as points are made, or balls hit, in accordance with the rules.

Points. See Rule 24.

Dead Ball. A ball on which the player has played since making a point. It is then *dead* to the player till he makes another point.

Direct Shot—Roquet. This is a direct shot, whether the ball in passing to its destination does or does not carom from a wire, a stake, or the border.

Drive or Block—English "Rush." A roquet played so as to send the object ball to some desired spot.

Slice or Cut. To drive the object ball to a desired position, by causing player's ball to hit it on one side.

Run. The making of a number of points in the same turn.

Set up. To locate the balls, so as to afford facility for making the next point or run.

Wiring. To leave the balls so that the next player finds a wire or stake between his ball and the object ball.

Object Ball. The ball at which the player aims.

Jump Shot. Striking the ball so as to make it jump over any obstacle between it and the object aimed at. To do this, the ball should be struck with considerable force on the top just back of the center.

Guilty or Danger Ball. The next ball to play on the adversary's side.

Innocent Ball. The last played ball of the adversary.

Rover. A ball that has made all the points except the last.

Loose Croquet. Striking a ball when it is in contact with another, where it has been placed for the purpose of Croquet, thus moving both balls.

Tight Croquet. Holding with the hand or foot a ball placed against another for the sake of croquet, thus allowing only the latter to be moved.

Carom. Rebounding from an arch, a stake, a ball, on the border.

Variations. The most important variation in the game is the "tight croquet," which is often substituted at pleasure for the roquet-croquet or "loose croquet." This method, employing either the hand or the foot, has been already described. In the early form of the game the tight

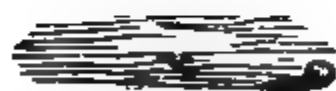
croquet was the usual method, but it has long been discarded by scientific players, except in the Western States, where it is carried to a high degree of skill. The word "croquet" as formerly used, always meant the tight croquet, but is sometimes used by modern players to designate loose croquet. To avoid confusion the appropriate adjective should be used. Some of the preceding rules can be

any ball if such ball has been once hit since making an arch. This form of the game is rarely played because of its great difficulty.

Parlor Croquet. Croquet sets for use in the parlor are sold at toy shops. The hoops are mounted on stands so that they will stand upright on the floor, and hoops, mallets, and balls are all smaller than those used in the lawn game, the mallet handles being usually from one to three feet long. Sometimes, however, a billiard or other level cloth-covered table, with elastic border, is fixed with arches and stakes, like a diminutive croquet field. This affords an opportunity for much skill with short-handed mallets and ivory balls, and as an indoor amusement is next to billiards.

History. It is thought that croquet is derived from the ancient game of *Paille-Maille* (Ball-Mallets) which was played in France as early as the 13th century, and which, under the name of Pall Mall, was fashionable in England in the time of the Stuarts, and has given its name to one of the principal streets in London. Pall Mall, or Mall, was played with a mallet, a ball, and two hoops, or a hoop and a stake. From the name of this game is derived our word pell-mell.

Croquet, as it is now played, was taken to England from Ireland, where it was introduced from France. The illustration shows a kind of croquet played in that country in 1826.



Pall Mall.

construed and used only in "loose croquet." All others may be used for tight croquet, and adopted therefore. The Western Clubs use the rules of the National Association herein published, which are sufficient for all purposes. Tight croquet gives a splendid chance for showing skill in placing balls, accurate hitting, and driving balls, as the act of croquet leaves the playing ball near where the roqueted ball rested.

Dead Ball Game. In this a ball is after the first turn never alive on



Croquet in France in 1826.

It was first played in Ireland as a fashionable game about 1852, and in England about 1856. It was introduced into the United States about 1865, and for many years was the most popular of lawn games; but of late it has been almost superseded in England, and in many parts of the United States, by Lawn TENNIS. Since its introduction into the United States croquet has been much modified. The number of arches has been increased, their positions have been changed, and the size of the ground has been diminished. In 1882 the National Croquet Association was organized in New York, and since that year it has held annual tournaments. The clubs in the Association are mostly from New England and the Middle States. The chief Western clubs, whose style of play is slightly different, have never been represented, though they have been invited.

The Association has fine grounds at Norwich, Conn., where the annual tournaments have been held since 1883. Cottage City, Martha's Vineyard, is a great place for croquet during the summer season. The grounds there are among the finest in the country, and it is a general practice ground for many during the summer who participate afterwards in the annual tournament at Norwich.

CROSS QUESTIONS, a game played by any number of persons, who sit in a circle. Each puts a question to his right hand neighbor, and receives an answer. Each of the players in turn then repeats aloud the question that his left hand neighbor asked of him and the answer that his right hand neighbor gave. In order that the result may be more amusing, it should be agreed beforehand what kind of questions are to be asked. For instance, it may be agreed that each is to ask why his neighbor does a certain thing, real or fictitious. Thus B asks C, on his right hand, "Why do you sit so near

the fire?" C answers, "Because I like the heat." A asks B, "Why did you fall into the water yesterday?" and he replies, "Because I went too near the edge." When it is B's turn, he must tell A's question and C's answer, thus, "Why did you fall into the water?" "Because I like the heat," and so on.

The game is often played by giving the right hand neighbor a predicament and the left-hand a solution, and then telling the predicament that comes from the left and the solution from the right. It is then called **Predicaments**.

CRYSTALLIZATION, Experiments in. 1. Dissolve salt in water till it will hold no more, and then dip a slip of glass into the solution, so that when it is removed it will be wet with the liquid. Watch the glass, holding it in the sun, and presently little specks will appear in the film of liquid. These will grow larger, and others will appear, until the glass is covered with crystals of salt. If the formation is watched through a magnifying glass it will be more interesting.

2. Try, in the same way, other substances which will dissolve in water, such as sugar, washing soda, sal ammoniac, chlorate of potash, or alum. The crystals formed by each substance have their own shape and method of formation, some branching out over the glass like the growth of a plant.

3. Project the growing crystals on the wall by holding them before a lens in a beam of light from a HELIOSTAT, as directed under MAGIC LANTERN, and the crystals will appear enormous and seem to grow very rapidly.

4. Dissolve in hot water as much alum as it will hold, and place in the solution any object you wish to cover with crystals. Set the solution in a quiet place, and in a few hours crystals of alum will be deposited on all of the objects. In this way baskets made of iron wire may be covered,

or dried grasses may be made to look as if laden with frost.

5. Fill one third of a bottle or jar with silicate of soda, often called "soluble glass," and the rest with clear water, and shake till the two fluids have thoroughly mixed. Then drop into the bottom of the jar crystals, the size of a pea, of one or more of the following substances: aluminum sulphate, potash alum, protosulphate of iron, copperas, or blue vitriol. If the jar is large several may be used. Set the jar in a quiet place and in a few hours a growth of crystals will begin from each substance, branching upward like vegetation, but different in each case. When the growth has reached the surface it may be stopped by pouring water gently into the jar, which will carry off the soluble glass gradually in the overflow. The crystals may thus be preserved, but if the jar is to be moved a layer of sand quarter or half an inch thick must be put into the bottle to begin with, the crystals of alum and the other substances are pressed down into this with a glass rod, and are thus held firmly in their places.

6. Put a twig or bit of a shrub in a jar, stem upward. Drop a few crystals of benzoic acid on a plate of hot iron, and invert the jar over them. The crystals will turn to vapor which will crystallize again on the shrub in a form resembling hoar frost.

7. Dissolve in a quantity of hot water, sufficient to half fill the glass or tube in which the experiment is to be tried, ten times its weight of hyposulphite of soda. Having warmed a tall narrow glass, or test-tube, by means of boiling water, pour the solution slowly into it. Make a similar solution of acetate of soda and pour carefully in above the first solution, on which it will float. On this pour a layer of boiling-hot water. Allow the solutions to cool slowly, and then lower into the glass a crystal of hyposulphite of soda on the

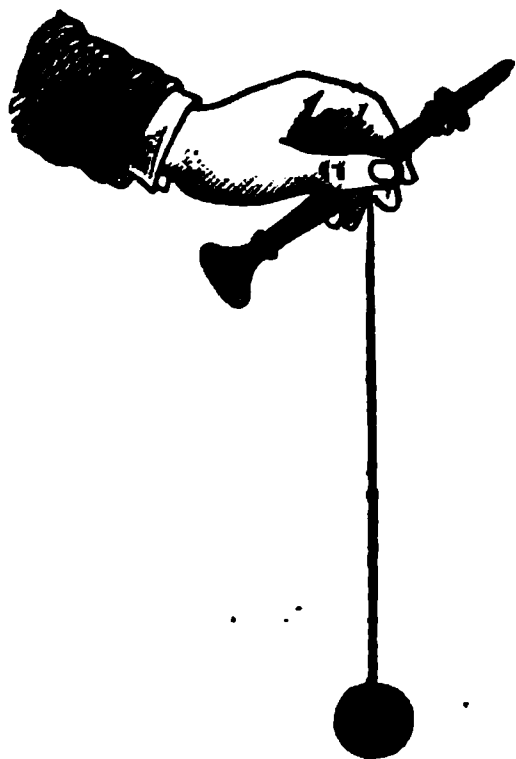
end of a thread. It will pass through the upper solution without disturbing it, but as soon as it reaches the lower one, that one will crystallize at

Crystallisation. Experiment 7.

once. A similar crystal of acetate of soda is now lowered into the upper solution which then crystallizes in like manner.

CUP AND BALL, a game played by one or more persons with a wooden or ivory ball connected by a string with a shallow cup, just large enough to fit the ball, on the end of a handle about a foot long. The other end of the handle is pointed and made to fit a corresponding hole in the ball. The game consists in trying to catch the ball in the cup. The player, taking the cup by its handle, throws the ball upward in the air and catches it in the cup as it falls. This is easily done after sufficient practice. If more than one person play, each has a trial in turn, and he who catches the ball after a stated number of trials, agreed on beforehand, is the winner. When the player can easily catch the ball in the cup, he should try to do so by sticking the pointed end of the handle in the hole. The illustration shows

the cup held in position to catch the ball on the point. This requires great skill, for to do it the ball must be given a twirling motion around the axis passing through the hole. In catching the ball in the cup, the latter must be placed under the ball and lowered quickly, so that the two are both moving in the same direction as the ball strikes it; otherwise the ball is apt to bound out of the



Cup and Ball.

cup. In France the cup and ball is called *Le Bilbouquet* (Ball-bouquet). Henri III., King of France, and his courtiers were fond of playing with it, and it came into great favor again in the reign of Louis XV. In that time a gentleman of fashion always carried a cup and ball of ivory, and even actors and actresses appeared on the stage in tragedy bearing the toys. Says a French writer: "It must have been rather amusing to hear Orestes or Phedra breathing forth tragic fury with cup and ball in hand." Its popularity in France was still great at the time of the Revolution, when it was succeeded in favor by *L'Emigrant*. (See BANDILORE.)

CUPID COMES, an alphabetical game played by any number of persons, each of whom tells how Cupid Comes, in answer to a question. The answers must begin with the letters

of the alphabet in order, and must all end in "ing." Thus, the first player says to his neighbor "Cupid Comes." The neighbor asks "How does he come?" and the first player replies, for instance, "Angling." The second player then says to the third: "Cupid Comes," and, in answer to the same question, replies "Boiling." So the game goes on till the alphabet is exhausted. Sometimes it is then repeated, the answers ending in "ly." Cupid then is said to come Amiably, Bravely, Cautiously, etc. Sometimes the letter A is used by all the players in the first round, B in the second round, and so on. The game thus lasts longer. In this case, any one who gives an answer already given must pay a forfeit.

CURLING, a game played on the ice by any number of persons, divided into two sides, who try to slide stones as near as possible to two points called "Tees." A rink or course is laid out on a piece of strong ice about 7 yards wide and not less than 50 yards in length. At the opposite ends of the rink, 38 yards apart, are two small holes called "Tees," around each of which a circle 14 feet in diameter is drawn. The space inside of this circle is called the "brough" or "tee-head," and two smaller circles are drawn inside to make measurement more easy. Four yards behind each Tee a hack is cut in the ice, or a piece of corrugated iron, called a "crampit," 3½ feet long by 1 foot in width, is placed for the player to stand on when delivering his stone, making the whole distance played 42 yards. Seven yards in front of each Tee is a mark called the hog score, and if any stone fails to pass this it is called a "hog." Curling stones are made of various kinds of granite, and weigh from 30 to 50 pounds each. They are flattened spheres in shape, not more than 36 inches around and not higher than one-eighth their greatest circumference. The handles are made of

iron or brass, nickel or silver plated, with a grip for the hand of ebony, hardened rubber or ivory, screwed to a bolt running through the stone. Each player has a pair of curling stones, and the sides are divided by lots into sets of two opponents each. Each pair of opponents play their



Curling Rink.

stones alternately, and then the next pair plays. Each player tries to slide his stone as near to the Tee as possible, and also to knock away any of his opponents' stones that have already been played. In delivering, the stone is slightly raised from the ice and then slid along toward the furthest Tee, with more or less force as the occasion requires. It is better play for the first shot to lie three feet in front of the Tee than one foot behind it, as the former may be "touched up" (driven nearer the Tee) and the latter "touched out" unless well guarded. Each player, besides trying to knock his opponent's stones out of the "brough," tries to guard his own side from danger of being knocked out.

When a stone hits the inside of another and bounds in toward

appeared directly in its way. When a stone on the Tee is knocked out of the circle by another which remains within it the shot is called a "chap and lie"; when a stone on the Tee is partially guarded by another outside, and yet an opponent succeeds in knocking it off, he is said to "chip the winner." If a stone is very near the Tee, those on the same side as its owner strive to place their stones so as to protect it from the enemy's attacks. When all have played, the distances of the various stones from the Tee are determined with the aid of the "broughs." Every stone that is nearer the Tee than any on the

Curling Stone.

opposite side scores one point or one "shot," as it is called. Each one then takes a turn at the opposite Tee in the same order as before, and the game thus goes on till one of the sides has won.

The way in which a game shall be won depends on agreement made beforehand. It may be done by the side that first scores 21 or 31 shots, or the one that scores most shots in 21 or 25 "ends" or innings; or by the one that is ahead at the end of 3 or 4 hours play.

RULES OF THE GAME.

1. Four yards behind each Tee a circle 18 inches in diameter shall be drawn, on the left hand side of the line joining the Tees, and just touching it. In this circle each player must stand when playing his stone at the more distant Tee, if he be right-handed. If left-handed he must stand in a similar circle on the right of the central line.

2. No stone shall count that is without the farther edge of a circle, or "brough" drawn with a radius of 7 feet from the Tee as a center.

3. A straight line called a "hog score" is drawn across the rink at a distance from each Tee equal to one-sixth the entire length of the rink. Every stone not reaching this line is called a "hog," and is taken off the ice except it strike another stone lying on the line.

4. No stone shall be changed after the beginning of a game, unless it be broken, in which case the largest piece is scored for the play in which it was broken.

5. If the played stone rolls and stops on its side or top it shall not be counted, but put off the ice.

6. If the handle parts from the stone in playing, the player must keep hold of it, otherwise he shall not be entitled to replay his shot turn.

7. No player must cross the rink, or go on it except when sweeping in accordance with the following rule.

8. Both parties may sweep the rink; the player's party while the stone is moving from the middle line to the Tee, and the opposite party after it passes the Tee. All sweeping must be from side to side, and no sweepings must be left in front of a sliding stone.

9. If a player's stone be obstructed by his own party it shall be put off the ice; if by the opposite party it shall be placed where the skip of the side to which it belongs may direct.

10. If a player play out of turn his stone may be stopped and returned, but if the mistake is not discovered till the stone is at rest, the opposite party is allowed the choice of letting the shot stand and adding one to their score, or of declaring the round void.

11. If a player play a wrong stone, it may be stopped and returned, but if allowed to come to rest, it shall be replaced by his own.

12. No shot shall be measured till the end of the round.

13. The "skips" or captains of the two sides have exclusive control each of his own party. Each, when it is his turn to play, appoints some other player to take temporary charge. The skips decide on the order of play, direct where their men shall stand, and how they shall sweep, and decide disputed questions. If they cannot agree, the dispute shall be referred to an umpire or some outsider. No one but the skip on his own side shall address any player in the act of sliding his stone.

History. Curling originated in Scotland, where it has been a favorite for three hundred years. It is played there by all classes of people, a wealthy landowner sometimes acting as skip for one party, while the leader of the other is a common laborer.

The game was first played on this continent at Montreal about the beginning of this century, being introduced there by Scotchmen. It is now played in all parts of the United States wherever a sheet of ice can be had, Americans having rapidly become experts at the game. Owing to intense cold and snowstorms in Canada covered rinks are mostly used, lighted and used in the evening as well as by daylight. The unwritten laws of curling against any gambling or betting on the game, or profanity on the ice, are very emphatic and rigidly enforced. The Grand National Curling Club of America, organized in 1867, and having now 44 associated clubs, has done a great deal toward popularizing the game, and reducing it to a science in this country. Matches for several championship medals are played for annually under its auspices. The records in the oldest of these, that for the Gordon medal, are given in the appendix. Besides these "rink medals," others called "point medals" are contended for, the object being to play perfectly certain shots, such as "inwicking," "out-

wicking," "chap and lie," and "chip the winner."

Curling stones are greatly improved of late years both in appearance and usefulness, the best being made from granite quarried at Ailsa-craig, a barren island on the Scottish coast. They are known as gray, blue, and red hones. The word "Curling" applies to the curves in which skilled players send their stones to avoid obstacles. Similar games are known in Holland as *Cal-luiten*, in Flanders as *Eisblocken* (ice-blocks), and in Germany as *Eis-kugeln* (ice-balls).

CURVE OF QUICKEST DESCENT. The shape of the trough down which a marble will roll in the shortest time from one point to another is not a straight line, as one might think, but a curve called a cycloid. Such a trough can be made as follows: To draw the cycloid, procure a circular piece of board or thick pasteboard, a ruler, or straight board more than half as long as the circumference of the circle, and some sheets of blank newspaper. The size may be as large as desired, but a good one is made by taking a circle two feet in diameter and a ruler about four feet long. Lay the paper on a smooth floor and the ruler upon it. Cut a notch in the edge of the circle to hold the point of a lead pencil. Lay the circle on the paper with the notch touching the ruler, place the pencil point in the notch, and roll the circle along the ruler, taking care that it does not slide at all. The curve drawn by the pencil held in the notch is a cycloid. When the notch has reached the top, that is, when the circle has rolled half-way around, stop. To make the trough, take a strip of pine wood an inch wide and thin enough to bend easily. Bend it to the curve, as it lies on the floor, and hold it in shape by sticking pins into the floor on each side of it. Then lay down a stiff piece of wood, also an inch wide, parallel with the ruler and

touching the curve at the point where the drawing was stopped. Fasten the curved and straight strips together by nailing pieces of lath from one to the other, so that the curved piece will keep its shape. Set the arrangement upright, the straight piece forming the base, and glue strips of paper along the side of the curved piece to form a trough. It will be found that a marble will roll down this curve quicker than down any other line connecting the same points. To show this, troughs can be made of various shapes, including one straight line. If marbles be held at the top of these and released all at the same time, the one on the cycloid will always get to the bottom quickest.

Another curious thing about this curve is that a marble takes the same time to roll to the bottom of it, no matter where it starts. For instance, if one marble be held at the top and another half-way down, and both be released at once, the upper one will strike the lower one just as it gets to the bottom. This curve is often called the *Brachistochrone*, from the Greek *brachistos*, shortest, and *chronos*, time.

CYCLING. The early forms of bicycle are described in the article *VELOCIPEDE* (C. C. T.). About a thousand varieties of bicycles and tricycles are now made, but they all belong to five or six classes or types. They have frames of steel, but generally the rims of the wheels, and sometimes the handle-bars, are of wood, and the wheels have hollow rubber tires which are inflated with air. The pedals, by which the feet operate the wheels, have rubber bars or steel plates, and the axles revolve on what are called "ball bearings," that is, the axle rests near its ends, and revolves, on rows of little steel balls to lessen the friction, as shown in Fig. 1. The bicycles now almost universally used are of the type originally for a short time called the "rover," from the name of the first

one of the kind that became popular. They were also known as "safeties," although there were other types of so-called safety bicycles, the name

attached were directly on the axle of the large wheel. The "Star," which was a transition form, had the small wheel in front, and the large wheel was worked by levers, as seen in Fig. 3. The early safeties, of the Kangaroo type, which was practically a small "ordinary," were often called "dwarf" bicycles because the front wheel was much smaller than in the ordinary kind. Another kind of safety bicycle, called the "Otto," after its inventor, deserves notice only as a curiosity, being unlike other bicycles in having its wheels side by side, thus resembling a tricycle without its small wheel. The rider's seat was placed between them, above the axle, and he was supposed to keep his balance by the way he worked the pedals. There was a prop behind to strike the ground if the machine tipped backward. This kind of bicycle has never been used in the United States and but rarely in England. It requires special practice to ride it.

Fig. 1.—Ball Bearings.

being given to almost any bicycle which differed in shape and construction from the high or "ordinary" bicycle. The French still call the type "bicyclettes." The wheels are generally of the same size, 28 inches in diameter, and 26 or 24 for children. The rear one drives and the front one steers. The pedals are in the middle between the wheels, and are generally connected with the rear wheel by a chain, although in chainless wheels some other device, such as a rod with gears at the ends, is substituted. Bicycles for women have the upper cross tube of the frame curved downward toward the bottom bracket so as to remove everything in the way of a skirt. The small-wheeled cycle was originally called a "safety" because there was less danger of a fall from it than from the type of wheel then in common use—that with a very large wheel in front. The old type still retains the name of "ordinary," though it is no longer used. It had no gear, and the cranks to which the pedals are

Fig. 2.—"Ordinary" Bicycle.

The Tandem bicycle is intended to be ridden by two persons tandem—that is, one in front of the other. Both riders work pedals, connected

with the axle of the rear wheel by two chains. The machine may be constructed so that it may be steered by either or both riders. When the front seat is adapted for women's use, having a drop-frame, the tandem is called a "combination" tandem. Bicycles for three, four, or more riders are also occasionally made. They are called, respectively, "triplets," "quadruplets," "quintuplets," etc. It is possible to attain great speed on them, as the gear can be made very high.

Tricycles. The tricycle is a three-wheeled machine which can be ridden by either girls or boys. It is safe, and runs very easily and smoothly. It is used by women and elderly people, especially in England. The kind shown in Fig. 6 is the one now generally in use. One of the first to become popular was known as the "Cripper" type, said to have

had a race with these machines in New York in 1888, but they have never been used practically, except perhaps to give practice in rowing. Another

Fig. 4.—Safety Bicycle.

curious tricycle, for use on a railway track, is shown in Fig. 9. The wheels have flanges like car wheels, and the small wheel is directly behind one of the large ones, so as to run on the same rail.

Various fittings and equipments are used on almost all cycles, especially if the rider is taking a long trip. A cyclometer is an arrangement connected with the wheel, usually fastened to the front axle, which shows the distance traveled by the cycle. A lantern is generally required to be carried at night; it is secured sometimes to the hub of the forward wheel, to the fork-side, but more generally on the head, just below the handle bars. Lanterns serve the double purpose of showing the

Fig. 3.—Star Bicycle.

been named from Robert Cripps, a famous English rider.

Tandem tricycles are also occasionally used. The "Sociable" tricycle has its two seats side by side, instead of one in front of the other.

One kind of tricycle, called the "Road Sculler," is worked by the hands by an action similar to rowing. Several professional oarsmen

rider the condition of the road in front of him, and of preventing collisions by making his coming known to others. They are usually oil lamps with powerful reflectors, but electric lamps with portable batteries have been made, and one kind uses acetylene gas, which is generated as it is wanted by chemical means.

Bells or alarms are carried to give

warning of the cycle's approach. Some make a continuous noise, like an electric bell, or clock alarm, while others give a single stroke, and

possible to learn on an ordinary road, and some think this preferable, because after learning on a smooth floor it is difficult, at first, to ride in

Fig. 5.—Ladies' Bicycle.

still others can be operated in either way. They are generally operated by pressing a lever. Instead of a bell, a whistle was formerly much used, but most local regulations now require a bell.

An arrangement of steel and leather straps for carrying baggage is usually attached to the cycle on a long trip. One of the devices used is shown in Fig. 14.

The rider should carry with him also a tool bag (Fig. 15), containing a wrench, an oil can, a piece of cloth, chain lubricant, and a tire-repairing kit, for use in keeping his machine

Fig. 7.—Tandem Tricycle.

the street. The learner may get on his bicycle at first while an assistant holds it, mounting not being practiced till later. The first thing to be learned is the balance, which is acquired only by practice. The great art consists in turning the forward wheel very slightly toward whichever side the bicycle begins to fall. It is necessary to have aid at first from some experienced rider, though some authorities advise that the balance be learned by riding down a very gentle incline without placing

Fig. 6.—Tricycle.

In order and repairing it in case of accident.

Bicycle riding can be learned in cities in special riding-schools established for the purpose, but it is



Fig. 8.—Tandem Safety.

the feet on the pedals at all. When the learner can make the descent successfully, he may begin to use the pedals, at first merely placing his feet on them, and gradually beginning to use a little force. The foot

should not be held rigidly when pedaling, using force only on the down stroke, but the crank should be pushed forward at the top of the stroke and back at the bottom. In order to do this the heel should be dropped at the top and raised at the bottom. This is called "ankle motion."

Position. The rider should sit erect unless he wishes to attain a high speed, is running against the

wind, or is mounting a hill, when it lightens the work somewhat to lean forward over the handles. The handles should be held lightly, and the rider should practice steering with one hand. It is possible also to ride without touching the handles at all, guiding the bicycle simply by altering the balance. The bicycle can be slowed by using the brake or by "back pedaling," that is, by pressing down on each pedal slightly

Fig. 9.—Railway Tricycle.

as it rises. A skillful rider can thus regulate his speed when descending a moderate hill, exactly as he wishes. In learning to use the brake, it should be applied cautiously at first. The sole of the shoe may be used as a brake by applying it to the front tire, care being taken to place it sideways, so that the toe will not be drawn into the fork. This requires much care and skill.

"Coasting" is riding downhill

without touching the pedals, the feet being on the "coasters," which are rests fastened on the front fork, or on the crown of the fork itself. Skillful riders coast swiftly down steep hills. The learner should not try it till he has practiced level riding for seven or eight weeks, and should then begin on a gentle, smooth incline. A bicycle should never be used to coast on a rough hill or an unknown hill, nor on a hill where

there are other vehicles. The rider should never let the machine get beyond his control.

Mounting and Dismounting. Dismounting is better learned before mounting, as it is easier. To dis-

mount by the pedal, which is the usual method, the rider slows his machine, and as the descending pedal reaches its lowest point he steps off from it, throwing the other leg over the frame. Mounting by the pedal is the reverse of this, and is the only method that can be used on a woman's wheel.

roduction of the bicycle there was some doubt as to its rights and privileges on the road, but the courts of nearly every State have ruled that it is a vehicle, with all the rights of one. In most large places bicycles, like other vehicles, are not allowed on sidewalks. Cycles approaching each other or other vehicles are obliged to turn out to the right, and a cycle overtaking another vehicle passes it on its left. If there is no room to pass unless the other vehicle turn aside, the cyclist should ring his bell, and where the room for passage is very narrow, he must dismount and lead his cycle past the other vehicle. In the evening the lantern should always be lighted.

Fig. 10.—Cyclometer.

To learn to mount from the step the rider should learn to steer the machine while standing on the step, without trying to gain the saddle. When he can do this he should slide gently into the saddle while the machine is moving slowly.

Tricks. Many fancy tricks which can be learned only by imitation and practice are performed by skilled bicyclists on their machines. They include vaulting in and out of the saddle, dismounting by throwing one leg over the handles, riding side-saddle, and balancing the machine on one wheel. Bicycle clubs often perform many difficult evolutions together, going through a sort of drill.

Rules of the Road. After the in-

Bicycles are most used in the neighborhood of cities or large towns, where there are hard, smooth roads. Tours or trips on bicycles should be planned with reference to the condition of the roads; and, to aid in this, bicycle guides are now published by many of the State divisions of the League of American Wheelmen giving lists and descriptions of practicable routes.

Fig. 11.—Cycle Bell.

Tires. The modern pneumatic tires are a source of trouble to many wheelmen, as they are apt to be punctured, which lets out the air and makes it almost impossible to ride on them. They are of two kinds—

double-tube and single-tube. In the former an inner tube of thin rubber holds the air, while a thick outer one takes the wear, and in the latter the two tubes are united into one. Each form has its advocates. Many so-called "unpuncturable" tires are made; but, in general, if a tire is elastic and easy-riding, it is easily punctured; if tough and hard, it is non-elastic and hard to ride. Every rider should learn how to repair slight punctures, and should

will go as far in one turn of the pedals. It is found by multiplying the diameter of the wheel (generally 28 inches) by the ratio of the number of teeth on the front to those on the rear sprocket. Thus, if the front sprocket has 20 teeth and the rear one 8, the gear is $28 \times \frac{20}{8}$, or 70; that is, the wheel corresponds to an old "ordinary" with a front wheel 5 feet 10 inches in diameter. The higher the gear the slower it is necessary to move the feet, but the

greater the pressure that has to be put on the pedals. High gears make hill climbing more difficult. Most gears are between 60 and 76, and the lower ones are better for the general rider, though each one must decide by experience which will suit him best.

Bicycle Racing. Races on bicycles are now included among the events of almost every outdoor athletic meeting. See **ATHLETICS**. Great speed has been attained on these machines. A bicycle can



Fig. 12.—Lamp and Luggage Carrier.

carry with him one of the numerous outfits sold for that purpose.

Gear. With the old-fashioned "ordinary" wheel the relation between the revolution of the pedals and the speed of the wheel depended wholly on the diameter of the front wheel. The larger the wheel the further the machine would travel for one turn of the cranks. Hence the speed was limited by the size of the wheel. With the modern form, as the cranks are not fastened to the axle of the wheel, this relation depends on the relative sizes of the front and rear sprockets, and is not so limited. The larger the front sprocket is in proportion to the rear one, the higher the possible speed. What is called the "gear" of a wheel is a distance equal to the diameter of the old "ordinary," that

not only go faster than a horse for a short distance, but it can keep up with one for a long distance. The League of American Wheelmen, which is the only national association of bicyclists in this country, though there are numerous local clubs, has now more than 100,000 members. It was formed in 1880 to secure the rights of riders in the courts, and, having done this, is now turning its attention to the improvement of highways. It has a division in nearly every State, the chief officer of which is called a Consul. It publishes a weekly paper called the "L. A. W. Bulletin," which is sent to each member for twenty-five cents. The following rules are condensed from those of the League governing bicycle racing, which have been adopted also by the National

Amateur Athletic Union, are as follows :

RULES FOR BICYCLE RACING.

Records. The standard table of recognized records shall be 1-4, 1-3, 1-2, 2-3, 3-4, 1 mile, and all even miles upward ; no intermediate distances.

Records against time may be made at an open meeting, or in private, and with or without pace-makers.

The Board will consider flying-start only in records against time ; standing-start only in competition records.

A competition record must be made in a race between men.

Records made with the assistance of other than recognized cycling machines, propelled by man power, will be recorded separately.

In unpaced events, or during unpaced record trials, there shall be no pacing devices, and only the rider making the trial shall be on the track.

Tracks. Tracks shall be measured on a line drawn eighteen inches out from a well-defined, fixed and continuous inner curb or pole ; no record shall be allowed on a track otherwise measured.

Machines Excluded. The Board reserves the right to exclude from the racing path any and all machines which, in its judgment, do not come within the commonly accepted meaning of the term "bicycle," either by peculiarity of construction or by undoubted mechanical advantages which they may possess.

Road Racing. The League of American Wheelmen regards racing on the public highways as an unlawful practice, and refuses to recognize and legislate for such form of the sport except to forbid the competing together therein or pacemaking one for the other, of amateurs and professionals.

Should any part of a road race be run upon the track, such part

immediately becomes subject to track rules.

TRACK RULES.

Officials; their Powers and Duties. The officers of all race meetings and cycling events shall be a referee, who must be an amateur wheelman, three judges at the finish, three time-keepers, one starter, one scorer, one clerk of the course, with assistants if necessary, and one umpire for each turn of the track, or more, at option of the referee. The referee, judges, and clerk of the course shall constitute the Executive Board.

The referee shall have general supervision of the race meeting. He shall give judgment on protests received by him, shall decide all questions or objections respecting foul riding or offenses which he may be personally cognizant of, or which may be brought to his attention by an umpire or other officer.

The judges shall decide the positions of the men at the finish. In case of disagreement the majority shall decide.

The timekeepers shall compare watches before the races are started, and shall note any variance ; they shall each time every event, and in case of disagreement the intermediate time of the three watches shall be the official time. Time shall be taken from the flash of a pistol. In case two watches of the three mark the same time, that shall be the official time.

The scorer shall record the laps made by each competitor, the order of the men at the finish as given him by the judges, and the time as given him by the timekeepers. He should indicate the commencement of the last lap by ringing a bell as the riders pass over the tape for the final lap, but the riders must keep count of the laps for themselves.

It shall be the duty of the starter, when it has been reported to him by the clerk of the course that all the competitors are ready, to see that

the timekeepers are warned, and, before starting the men, to say, "Mount"; in a few seconds after to say, "Are the timers ready? Are the starters ready?" and, if no reply to the contrary be given, to effect a start by a report of a pistol. Should the pistol miss fire, the start may be made by the word "Go." The starter shall announce to the competitors the distance which they are to ride. The starter may, at his

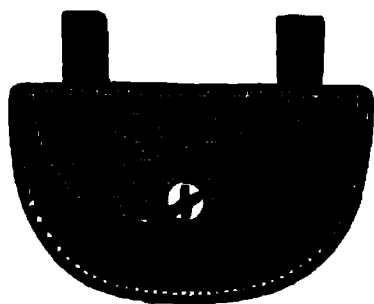


Fig. 13.—Tool Bag.

discretion, put back for a distance any competitor starting before the signal is given. In case of a false start, the competitors shall be called back by the starter by the ringing of a bell or pistol fire and restarted.

In case of a fall or accident within thirty feet of the scratch line, the contestants shall be recalled by the starter by the ringing of a bell or pistol fire, and the race started over again.

The clerk of the course shall call competitors in ample time for each event, and see that they are provided with numbers properly worn. He shall report the contestants to the scorers, see that they are on their appointed marks, and call the numbers for the scorers as they cross the line at the end of each lap.

It shall be the duty of the umpire to stand at such part of the field as the referee may direct, to watch closely the riding, and immediately after each race to report to the referee any unfair riding he may see.

Positions. The drawing for positions in each event shall be done by the promoters of the meeting, and the positions of the men shall appear

on the programme. When it becomes necessary to draw for positions on the grounds, the work shall be done by the clerk and starter in conjunction. In heat races the winner of a heat shall take the pole (or inside position) the succeeding heat, and the other riders shall take their positions in the order assigned them in judging the last preceding heat. When two or more riders make a dead heat, they shall start for the succeeding heat in the same positions with reference to the pole that they occupied at the finish of the dead heat.

When races are run in heats and a final, the winner of the fastest heat shall take the pole in the final, the winner of the second fastest heat the next position, and so on. If more than one qualifies for the final from each heat, the second man in fastest heat shall be next outside the winner of slowest heat, and so on. Only the winners of positions in the trial heats, as stipulated by the terms of the race, shall compete in the final.

No one shall be allowed in a final because of a foul or an accident in a trial heat.

Should two or more riders make a dead heat of any qualifying place in a trial heat, they shall both be allowed to enter the final heat, except in the National Championship. Should two or more riders make a dead heat of any final, or a dead heat for second or any lower place for which there is a prize, they may decide by lot who shall take the prize, or may again ride the distance to decide the race, at the discretion of the referee.

Starts. All starts shall be from the inside of the track, and, except in a flying-start event, shall be from a standstill, with the left hand toward the curb, and the machines shall be held in position by an attendant (the front wheel touching the starting line) until the signal is given by starter. Attendants, when

pushing off competitors, must keep behind the mark from which the competitors actually start. Should any part of the attendant touch the track in front of the mark, the competitor may be disqualified. Unless excused by the referee, every rider who enters in a handicap race must start in same.

Finish. The finish of all races shall be judged by the first part of the front wheel which touches the tape fastened flat on the ground at the winning post, and no rider shall be allowed a finishing position who abandons the track and afterward returns and crosses the tape.

Riding. Riders shall pass on the outside (unless the man passed be dismounted), and must be at least a clear length of the cycle in front before taking the inside, but on entering the homestretch in the last lap of a race, the foremost rider or riders must keep to that part of the track first selected; and the hindmost rider or riders, when there is sufficient room to pass on the inside or anywhere on the homestretch without interfering with others, shall be allowed to do so. A rider shall not change from the inner to the outside of the track during any part of a race when another rider is so near that in altering his position he interferes with or impedes the progress of the rider. No rider shall touch another.

No rider during a race shall turn his head to look backward, remove his hands from the handle-bars, or otherwise ride in a careless or unskillful manner, thereby imperiling the safety of other riders.

Competitors may dismount during a race at their pleasure, and may run with their cycles if they wish to, but they must keep to the extreme outside of the path whenever dismounted. If a rider be dismounted by accident, or to change his machine, an attendant may hold his machine while he mounts it, and he

shall so mount at the extreme outside of the path.

Time Limits. The referee may place a time limit on any race except handicap, team, and lap races. The time limit shall not be announced to the contestants until their arrival at the tape, preparatory to the start of the race. If the competitors finish within the limit, they shall receive the prizes. If they fail to so finish, and the referee is convinced by their riding and the time that they endeavored to reach the limit, he may award the prizes.

Pacemaking. A general pace-maker may be put in any race by the race promoter, having previously notified the referee of the fact. He shall assist no single rider, but shall act to increase the speed of the race in general. He shall, if a single rider only, be entitled to any place or prize he may win, if he starts from the scratch, or may be rewarded by a special prize, within the limits of the class.

Tandems, or pacing machines carrying more than two riders, may be put in to pace competitions *only by written consent of the member of the Racing Board in charge of the district.*

Track Privileges and Decorum. No person whosoever shall be allowed inside the track except the officials of the meet. The handicappers of the meet shall at all times, however, have track privileges. Authorized persons shall wear a badge. Competitors or pacemakers not engaged in a race actually taking place shall not be allowed inside or on the track. No one shall be allowed to "coach" competitors on the track. No shouting or remarks by trainers or attendants to encourage certain riders or disconcert others shall be permitted.

Choice of Machines and Costumes. Choice or change of machine and choice of costume shall not be limited except that shirt shall not

bare shoulders, and breeches must reach to the knees.

In races distinctly stated on the programme of events to be for a particular class of machine, this rule shall not apply so far as choice and change of machine are concerned. Safety bicycle races shall be limited to machines whose driving wheel does not exceed thirty-six inches in diameter.

Competitors to Wear Numbers. Every competitor shall receive in the dressing-room a number corresponding with his number on the programme, which must be worn on his back or right shoulder during the race. He shall inform himself of the times at which he must compete, and wait the call of the clerk in the dressing-room.

Definition of Races. A novice race is open only to those who have never won a prize in a track race, and shall be the first race of the meet. A novice race is a class race.

A class race is only open to those who, up to date of the closing of the entries, have not won the first position in a track race or trial heat in the same or better time than the class under consideration. In all class races the time limit shall be the time of the class. If the competitors fail to finish within the limit, and it is a good day, good track, and there are pacemakers, the referee shall declare it no race. If they fail to finish in the time limit, and there are no pacemakers, or it is not (in the judgment of the referee) a good day, or it is not a good track, and the referee is convinced by their riding that they endeavored to reach the limit, and were not able to do so because of the absence of any one or all three conditions, he may award the prizes.

In a lap race the position of the first three men shall be taken at the finish of every lap. The first man shall score three points, the second man shall score two points, and the third man shall score one point, and

no others shall score. The contestant who crosses the line first at the finish shall, for that lap, score four points. The competitor who scores the greatest number of points shall be declared the winner, but any contestant, in order to secure a prize, must ride the entire distance and be within 150 yards of the finish when the first man crosses the tape at the end of the last lap. The 150-yard mark must be marked by a flag.

In a team race the positions of all the riders starting shall be taken at the end of the race.

The first man shall count a number of points equal to the number of men starting, the second one less, and so on.

The team scoring the greatest number of points shall be declared the winner.

A team shall be limited to three riders, each of whom shall have been a member of the club entering the team for at least three months previous to date of event. Each team member must also have resided within five miles of the city or town where the club has its headquarters for at least six months previous to the date of contest.

In a heat race the position of each rider must be taken at the finish of each heat. The first man shall count a number equal to that of the contestants in the first heat, the second man shall count one less, the third two less, and on on. The competitor who scores the greatest number of points shall be declared the winner.

Or, as an alternative, which must be stated on the programme as rule or alternative, in running a heat race, such event may be conducted under the rule outlined below:

When the race is best two out of three heats, the winner is not reached until one rider has won two heats, either through virtue of finishing first or by the disqualification of a competitor or competitors who may finish in front and lose such

position or positions through ruling or rulings of the referee. The second and other prizes shall be distributed according to the standing of the rider in the summary, heat winners to be placed before all those who have occupied lesser positions, and in case two riders are tied by

finishing an equal number of times in the same position, the one occupying the best position in the concluding heat shall be awarded the prize. In every heat a rider must finish within 150 yards of the winner or be adjudged distanced. In case a rider fails to win one heat in three, he will

Fig. 14.—English Cycle Post.

be disqualified from any subsequent heats that may be necessary to decide the prizes.

Entries in a consolation race shall be limited to those who have not won a prize in any event of the meeting; provided, however, if only a single prize is given in the team race, members of the winning team shall not be considered to have won a prize and shall be eligible to the consolation race.

In a pursuit race the conditions must be printed on the programme or announced to the spectators.

In a handicap race the marks must be printed on the programme, and the men must start from the marks assigned by the handicapper in trial heats and finals.

In middle-distance races (10 to 100 miles) the terms and conditions must be printed on the programme.

Ignorance of Rules No Excuse. Ignorance of any of the foregoing rules will not be considered a valid excuse for violation.

History. The early history of the bicycle and the tricycle is given in the article *Velocipede*, in C. C. T.

Since the introduction of the bicycle proper (about 1876), so many improvements have been made in it that it is now a very important machine and has found many uses which were once scarcely thought of. One of the greatest differences between the modern bicycle and the old velocipede is in the construction of the wheels. They were formerly made like those of a carriage, with stout wooden spokes, the weight resting on each spoke in turn as it came underneath the hub. Now the spokes are of steel wire, and the weight is supported by the spokes above the hub, which is hung, as it were, from the rim of the wheel. This plan, which is called the "suspension principle," by enabling the builders to make light wheels, has done much toward perfecting the modern bicycle. Many grown people use cycles now for health as well as recreation ;

many travel long distances on them ; they are used in delivering letters and parcels, and in England and

Fig. 15.—Military Cycle.

Germany soldiers are trained to ride the military cycle. Cycling has become a very popular pastime, and has grown to be something beyond mere boy's sport. Bicycles were first made in the United States in 1878, and hundreds of bicycle manufactories are now situated in this country.

D

DANCING

IMP. Join tightly with sealing wax the halves of a walnut shell from which the kernel has been removed. Fasten a little wooden doll, three or four inches long, by threads to the nut, weighting the doll with shot or otherwise, so that the nut will float in water with as little of its shell above

the surface as possible. Make a hole with an awl in the lower side of the nut and float it in a jar of water, filled within an inch or two of the top. Tie a piece of India-rubber cloth tightly over the top of the jar. If the India-rubber be now pressed with the finger the doll will sink, and when the pressure is removed it will rise again. This is because the pressure forces some water into the nut through the hole in the bottom, and the additional weight is just enough to sink it. This toy is called also Ludion or Bottle Imp, and small ones were sold on the streets of New York in 1889 under the name of "McGinty," being supposed to illustrate the popular song "Down went McGinty to the Bottom of the Sea."

Dancing Imp.

the surface as possible. Make a

DEVIL ON TWO STICKS. See FLYING CONE.

DIBS. See JACK STONES.

DICE (plural of die), small white cubes of ivory, bone, or celluloid, used in gaming. Each of the six faces or sides of a die is marked by a different number of black spots or dots, from 1 to 6. The dots are so arranged that the sum of the dots on opposite sides is always seven; that is, the One and Six, the Two and Five, and the Three and Four are opposite each other. As in cards, the one, two, and three-spots are often called respectively, the Ace, Deuce, and Tray. In playing, one or more of the dice are shaken and thrown from a dice-box upon a table. This is called a throw, and the numbers on the uppermost faces of the dice are said to have been thrown. The throw is unfair if a die rolls on the floor; if any one touches it while it is rolling on the table; if it is tilted on edge against some obstacle; or if one die rests on the top of another.

Dice are used to determine the moves in games like Backgammon and Parchesi, but several games may be played with them alone.

Raffling or Raffles, a game of dice, played by any number of persons with three dice. Each in turn throws till he throws two numbers alike, called a Pair. When all have thrown, he who made the highest throw wins. Pairs rank according to the number of spots on the paired dice, and a triplet, or three of a kind ranks higher than any Pair. Thus, a pair of Fives is higher than a pair of Fours, but three Twos is still higher.

Centennial, a game of Dice played by two or more persons, each for himself, or by partners, two or three on a side. The players use three dice at a time, and not only the numbers thrown, but the sum of any two or of all of them counts toward the score. The object is to score the numbers from 1 to 12 in order, and

then the numbers in reverse order back to 1. Each player may throw until he fails to score, when the turn passes to the left. Each player keeps his score by writing the numbers on paper as he makes them, and then crossing them out in reverse order. He whose numbers are crossed out first wins the game. Several numbers may be scored in one throw: thus 1, 2, and 3 score all the numbers up to 6. Partners have only one score between them, and the numbers thrown by each count toward it.

Help Your Neighbor, a game of dice played by any number of persons, with one die. Each player marks the numbers 1, 2, 3, 4, 5, 6, on paper. The one who begins the game then throws the die and marks out of his figures the number he throws; and he continues throwing as long as he can mark off the number thrown. When he throws a number that he has already marked off, the player on his left crosses it off his own score, and then takes his turn. Each player does likewise, and he whose score is all crossed off first wins. If, in the course of the game, neither a player nor his left-hand neighbor have the number that is thrown, the nearest player on the left who has it marks it off.

Draw Poker. The players use five dice, which are first thrown at one cast, and then any or all of them may be thrown again; just as in the card game each player may draw new cards. The "hands" are the same as in ordinary DRAW POKER, save that there is no Flush and that there can be five of a kind, which ranks above four of a kind and is the highest possible hand. The highest hand wins the pool. As every one sees the hands of all the other players, there is no "betting."

Multiplication. Three dice are thrown by each player, who, leaving the highest on the table, throws the other two again, and then the low-

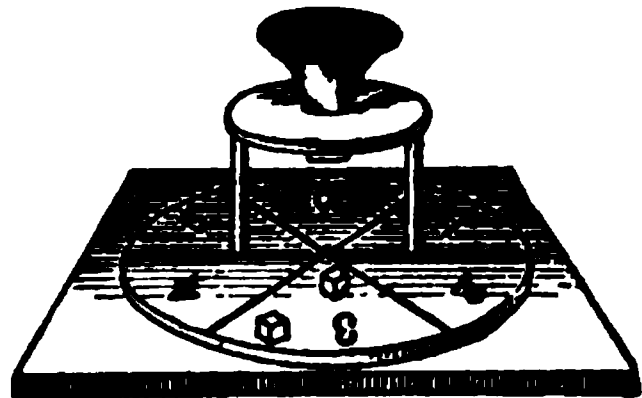
est of these is thrown a third time. The sum of the first two is multiplied by the third, and the player whose result is the highest wins the game.

Vingt-et-Un. Two dice are used, and each player throws as many times as he wishes. He, the sum of whose throws is nearest 21, is the winner. But if any one throw more than 21 he loses. *Vingt-et-Un* is French for Twenty-one.

Dice with Eight Sides. Dice formed of four-sided pyramids, fastened base to base, have recently been invented in France. Each die has thus eight sides, on which are marked numbers from two to nine. The value of a throw is the product of the numbers thrown; thus, with two dice it may be anywhere from four to eighty-one. These dice are intended to be used by children, to make them familiar with the multiplication table. They are called also octahedral dice, from the Greek *okto*, eight, and *hedron*, side.

History. Dice have been known since the earliest times. The Greeks said that they were invented by Palamedes at the siege of Troy. Plutarch says they were devised by the Egyptians; and bone or ivory dice have been found in Thebes, Egypt, similar to those now in use. They are mentioned by Homer in the *Odyssey*, in the *Rig Veda* (one of the sacred books of the Hindoos), and in other ancient writings. The Greeks and Romans gave to the various throws the names of heroes and gods, the best being called Venus, after the goddess of love. The game was very popular in Rome, where rich men, in the later days of the empire, sometimes staked their fortunes on a single throw. The Romans used two kinds of dice; *tali*, made of the huckle bones from the legs of sheep and goats, or to imitate them, and *tesserae*, cubical like our dice. The ends of the *tali* were left blank because they were so narrow, and the four other sides were numbered 1, 3, 4 and 6. With-

out the numbers the *tali* were played like our JACK STONES. Dice continued to be played so widely in Europe that in the Middle Ages there were in France academies where dice games were taught, and the makers of dice formed a separate company. They were many times forbidden, because used for gambling, and it is said that CARDS were originally devised to turn people's attention from them. A curious dice box once in use in England is shown



Old English Dice-box.

in the illustration. The dice used in it had no spots at all, and the value of the throw depended on where they fell when put into the funnel-shaped tube at the top.

Dice made of huckle bones, or to imitate them, are still used in Eastern countries, where the different throws are given names, as among the ancients. Thus the Arabs call the Ace "Thief," the Three "Lamb," and the Six "King"; and the Turks call the Three "Peasant" and the Four "Knight."

The origin of the word die is not certainly known, though in some form it appears in every language in Europe. The late Latin form was *dadus*, which some think is from *datus* (a thing given or thrown forth) and some from the Arabic *dadd*, a die.

DICTIONARY or VERBARIUM, a game played with pencil and paper, by any number of persons, who try to see which can make the largest number of words from the letters composing a larger word, called the Head-word. The word to be used,

which should contain as many vowels and as few double letters as possible, is first agreed upon, and each player writes it plainly at the head of his sheet of paper. Each then writes all the words he can think of, that can be made from letters in the Head-word. Those beginning with its initial letter are taken first, and a given time (usually from two to five minutes) is allowed in which to write them. At the end of that time the players count their words, and he who has made the longest list reads it. Any word that is on all the lists counts nothing, but other words count each as many points as the number of players who have omitted it. Afterwards each of the other players reads any words on his list that have not been marked. All words are crossed out as they are read. After this, words beginning with the second letter of the Head-word are written, and so on till the last letter has been reached. The player who scores the greatest number of points wins.

The game may often be made more interesting by choosing sides, but the sides should contain the same number of players, otherwise an omission would add more to the score of one side than to that of the other. The game is excellent training for rapidity of thought. The player's ability to write long lists of words quickly, increases greatly with practice, so that a beginner is almost always defeated.

RULES OF THE GAME.

1. At the beginning the players must agree as to what classes of words are allowable. One of the standard dictionaries may be selected, and any word allowed that can be found in it; or, no word may be allowed that the writer cannot define correctly. This prevents putting down groups of letters that sound like words, in hope that they may be in the dictionary. It must also be settled whether plurals in *s* and different moods and tenses of the

same verb are to count as separate words or not.

2. No letter may be repeated in any of the words, unless it is also repeated in the Head-word.

3. A time-keeper shall be selected who shall keep his watch open before him. No one shall write before the time-keeper says "begin," nor after he says "stop."

The word Verbarium is Latin and means a place where words abound. The game is sometimes called in New England "Androscoggin."

DIFFRACTION GRATING, Experiment with a. Paint one side of a square of glass with India ink or liquid blacking, so that light cannot shine through it, and then, with the point of a needle, rule parallel lines on it about one-tenth of an inch apart, scratching quite through the layer of black. Look through this glass at a candle flame, or the edge of any bright object, standing about twenty feet from it. Move the glass toward the eye and from it till it is at the proper distance, when one or more rainbow colored spots will be seen on each side of the flame. These spots can often be seen by half closing the eyes, and looking at the flame through the eyelashes, which thus take the place of the grating. The colors are produced by the interference of the light passing through the various scratches in a way which cannot be explained here, for want of room.

DISTILLATION. The process of distillation is described in C. C. T. under ALCOHOL. To make a simple still to distill water (See CHEMICAL EXPERIMENTS) fit a flask or test-tube with a stopper and delivery tube connecting with a flask or bottle (Fig. 1). The first flask or tube is partially filled with water and supported or held over an alcohol lamp, and the second stands in a basin of cold water. The water should come up much farther around the bottle than shown in the illustration. When the water in the first flask

begins to boil, the steam passes over to the second flask, where it condenses. The cold water in the basin must be replaced as fast as it begins to get warm.

A better way is to keep the cold water continually changing so that

it will never grow warm. This can be arranged as follows. Fasten together two or three argand lamp-chimneys with putty or plaster of Paris, so as to form a long tube as shown in Fig. 2. Close each end with two-holed rubber stopper or cork.

Fig. 1.—Simple Still.

Through one of the holes in each pass a glass tube so that it runs through the lamp chimneys without touching the sides. Support this arrangement about six inches from the table by placing it on two

blocks of wood. Connect one end of the glass tube with a kettle in which the water is to be boiled, and under the other place a cup to receive the distilled water. The tube should incline a little toward

Fig. 2.—Home-made Still.

this cup. In the other hole of each stopper put a short glass tube, connecting the lower one with a cold water faucet and the other with a sink. The lamp chimneys will thus be kept full of cold water, constantly chang-

ing. A bath tub is a good place in which to set up the still, for then the escaping cold water cannot possibly harm anything.

For method of distilling alcohol, See ALCOHOL, EXPERIMENTS WITH.

DOLLS. The manufacture of dolls is described in C. C. T. Many games can be played with dolls, some of which will be described.

Doll Show. Several children meet in one place, each bringing her dolls. Prizes should be offered for the prettiest doll, the most neatly dressed doll, the doll who has traveled farthest, and so on, at the pleasure of the exhibitors. All present should vote on the award, and the doll receiving the greatest number of votes is given the prize.

Paper Dolls. The paper dolls sold at toy shops are merely colored pictures printed on thick paper, which are to be cut out with scissors. Any picture can be cut out and used as a paper doll, but if it is not on stiff paper it must have another thickness fastened to it to stiffen it. Paper soldiers, bought at the stores in sheets, may be cut out and stiffened in the same way. Paper dolls and soldiers may be made to stand up by fastening them with glue or brads to the side of a small block of wood. Wooden button-molds make the best stands: stick a thin sliver of wood into the hole and then glue the paper doll to it. Paper furniture also may be bought at toy shops. After it is cut out it must be bent into shape and fastened by pasting down flaps which are cut out with it. Simple articles of furniture can be made by drawing them on thick paper, Bristol board, or card-board, and then cutting them out. The places for bending are cut half through with a sharp knife. The cut must be made in each case on what is to be the outside of the corner.

Vegetable Dolls. Dolls can be made of corn husks by putting a number of them together and tying thread around the neck and waist. The arms are formed of a separate piece of twisted husk drawn through the body crosswise, and both arms and legs are wound with thread to make them stiff. Another kind of

doll may be made with an ear of corn for a body, a small green apple for a head, hair of corn silk, and bonnet and dress of husks.

Still other kinds are formed with inverted flowers for dresses and seed vessels for heads, fastened together with thread. In all these cases, the eyes, nose, and mouth must be marked with ink.

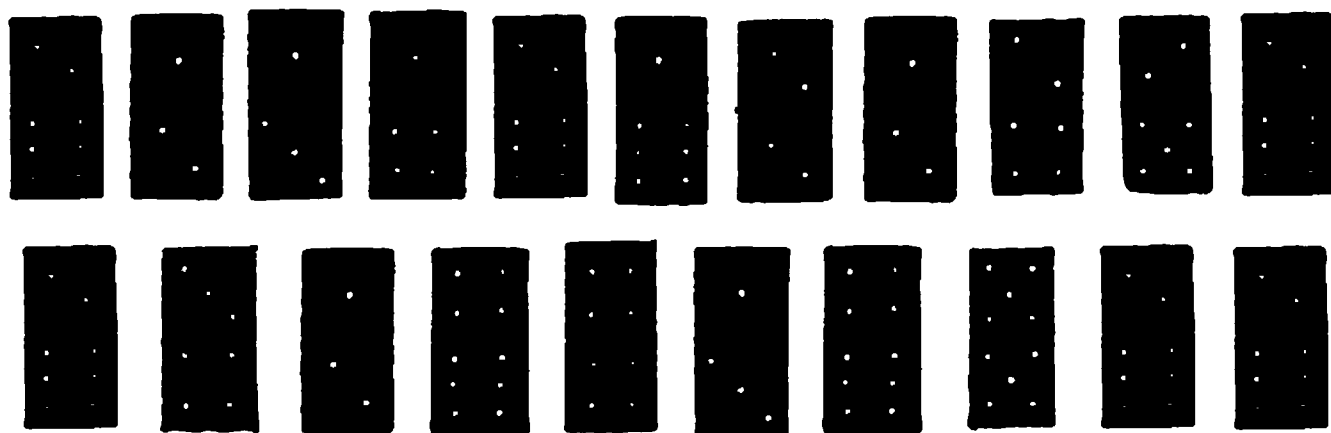
DOMINOES, flat pieces of ivory or bone, generally backed with ebony, used in playing various games. They are usually about two inches long, one inch wide, and a quarter of an inch thick. The face, which is commonly white, is divided by a line into two squares, each of which either is blank or has on it from one to six round spots or pips, grouped like those on DICE. A domino having the same number of spots in each of its squares is called a doublet. Others are named from the number of spots in both squares: thus, the Four-six has four spots in one square and six in the other. A single spot is often called Ace, and two and three spots are called Deuce and Tray, as in CARDS.

Twenty-eight Dominoes are used in playing games, the spots being arranged as follows: Double-blank, Blank-ace, Blank-two, Blank-three, Blank-four, Blank-five, Blank-six; Double-Ace, Ace-two, Ace-three, Ace-four, Ace-five, Ace-six; Double-Two, Two-three, Two-four, Two-five, Two-six; Double Three, Three-four, Three-five, Three-six; Double-Four, Four-five, Four-six; Double-Five, Five-six; Double-six. The picture shows them all but the blanks.

In the ordinary game of Dominoes, which can be played by from two to four persons, the Dominoes are first mixed as they lie on the table backs upward, and then each player draws seven. If any are left, they form what is called the "pool." Each usually stands his Dominoes on their sides in front of him on the table, placing them in a curved line, spots

inward, so that the other players cannot see them. The player having the highest doublet leads by placing any Domino he pleases on the table, face upward. The player on his left must then play a Domino one of whose squares matches one of its squares. The two are placed in line, with the matched ends touching, and then each player in order to

the left must match in like manner one of the ends of the line thus formed, as in the illustration. If a doublet is played, it is often placed crosswise instead of endwise in the line. If any one cannot play, and any Dominoes remain in the pool, he must draw them, one by one, before his neighbor's turn, till he can play or till the pool is gone. The player who first

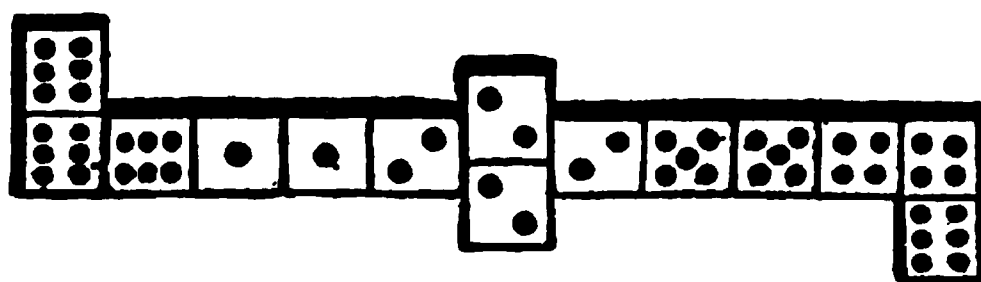


Dominoes.

gets rid of all his pieces cries "Domino" and scores the sum of the spots on his opponents' remaining Dominoes. If it happens that no one can play, while each has Dominoes left, the game is said to be blocked, and he who has the smallest number of spots on his remaining Dominoes scores as before. When "Domino" is announced, or the game is blocked,

the Dominoes are mixed again, each draws seven, as before, and the game goes on. He whose score first reaches 100 usually wins the game, but the necessary number may be made greater or less by agreement. Sometimes the game is varied by allowing no drawing after each has taken his seven Dominoes.

Muggins, a game of Dominoes



Domino Game.

in which each player draws five at the beginning. If any one plays so that the sum of the spots on the end squares of the line is 5, 10, 15, or 20, he scores that number of points. If the leader play a Domino, the sum of whose spots is five or ten, he scores in like manner. Thus if a Four is at one end and a Two at the other he who can match the Two with a Two-

six scores 10, since the sum of the end spots will equal that number after his play. So also if a Double-four is at one end and any one plays a Double-six on the other he scores 20. In other respects Muggins is like the ordinary game.

Bergen Game, a game of Dominoes in which each player draws six at the beginning. When a player

makes both ends of the line alike, he is said to make a Double Header, and scores two. When he plays so that there is a doublet on one end, and the other end is of the same value he is said to make a Triple Header, and scores three. He who announces "Domino," scores one. If the game is blocked, the player with the smallest number of spots on his remaining Dominoes scores one, but the holder of a doublet cannot score, even if he have less spots than the others, unless all have doublets, when he who has the smallest number of doublets scores. If all have the same number of doublets, he scores that has the lowest. The number of points in this game is small, usually 10 or 15.

Matadore, a game of Dominoes in which the pieces, instead of being matched, are placed so that the sum of the spots on touching ends of two Dominoes is always seven. Thus a Five must join a Two, a Six an Ace, and so on. The Double-blank, and the three Dominoes with seven spots (the Six-ace, Five-two, and Four-three) are called Matadores, and can be played at any time. It will be noted that only a Matadore can be played to a blank. Each player draws three Dominoes at the beginning of the game, and he who has the highest doublet, or the highest piece, if there are no doublets, leads. If any one cannot play, he must draw Dominoes one by one in succession from the pool till he can play, or till the pool is gone. He must play if he can. But when only two persons play the game, three Dominoes must be left in the pool, so that neither player may know exactly what the other has. The scoring is the same as in the ordinary game. In Matadore the player with the smallest number of Dominoes usually tries to block the game by playing blanks. His opponents can prevent him by playing only Dominoes that match blanks already on the table.

Tidley-Wink, a game of Domi-

noes, played by four, six, or eight persons. Each draws three Dominoes to begin with, and the one with the highest double leads it. The other players follow, in order, each matching the Domino played just before him, as in the ordinary game. Any one who cannot play must wait till his turn comes again. Any one who plays a Double is allowed to play another Domino to it, if he can, before the next player takes his turn. He who first gets rid of his three Dominoes calls out "Tidley-Wink," and wins the game.

Poker. Each player is given five Dominoes and the game proceeds as in DRAW POKER with cards, save that there is no drawing. The hands, in the order of their value, beginning with the highest, are

1. An Invincible.—Five Doubles, or Four Doubles and a Six.
2. A Straight Six.—A sequence of sixes, as Six-Two, Six-Three, Six-Four, Six-Five.
3. Four Doubles.
4. A Straight Five.
5. A Full.—Three Doubles and two of a suit.
6. A Straight Four.
7. Three Doubles.
8. A Flush.—Five of a suit not in sequence.
9. A Pair.—Two Doubles.
10. The highest Domino in a hand that is none of the above. A Double always ranks above any other.

Card-games with Dominoes. Several games commonly played with cards may also be played with Dominoes. In this case the larger number on each Domino shows the suit, and the other number the rank in the suit. Thus, a doublet stands at the head of each suit, and the suits do not contain the same number of Dominoes. The Five-suit consists of Double-five, Five-four, Five-three, Five-two, Five-ace, Five-blank, and the Two-suit contains only Double-two, Two-ace, Two-blank. But the trump-suit contains all the Dominoes that bear the number of that suit,

whether the other number be smaller or larger; thus, if the Three-suit is trumps the cards in it rank as follows: Double-three, Three-six, Three-five, Three-four, Three-two, Three-ace, Three-blank. Of course those trump-cards that would ordinarily be counted in other suits must be omitted from these suits; thus, in the case just given, the card next below the Six-four is the Six-two, because the Six-three (or Three-six) is a trump.

Domino Euchre. The doublet of the trump suit is Right Bower; the next lower doublet is Left Bower; but when Blank is trump the Double-Six is Left Bower. The player who draws the lowest Domino is termed the dealer. After the drawing for deal the Dominoes are mixed again and each player in turn, beginning at the dealer's left, draws five. The dealer then turns face upward one of the Dominoes that remain, and its larger number shows the trump-suit. He that orders up, takes up, assists, or makes the trump, always leads, but in other respects the game is played as it is with cards.

Domino Rounce. This can be played by not more than four persons. When two or three play, the Dominoes in the pool are often divided in more than one Dummy or Dumby (that is—extra hand), so that each has the privilege of taking one, even if the player before him has already done so. When four play, there is only one Dummy, but it consists of seven pieces. The dealer is chosen, the trump turned, and the Dominoes drawn as in Domino Euchre; in other respects the game is played as it is with cards.

Bingo, the game of SIXTY-SIX played with Dominoes by two persons. Each player draws seven Dominoes at first, and one more after each trick, as in the card-game. The blanks count as seven spots; and the Double-blank, which is called Bingo, is the highest Domino, taking even the Double of trumps.

The game consists of seven points. He who first makes 70, scores one toward game. If he make 70 before his opponent make 30, he scores 2, and if he make 70 before his opponent has won a trick, he scores 3. If a player capture the Double of trumps with Bingo he scores one.

In reckoning the 70 points, the Double of trumps counts 28, and all other doubles and trumps according to the total number of the spots, but the remaining Dominoes have no value. The winner of a trick may announce or declare certain combinations as in the card game. These, with the points they count toward 70, are as follows:

Two Doubles,	20
Three "	40
Four "	50
Five "	60
Six "	70

If Bingo be among the doubles, the group counts 10 more. In other respects the game is played like SIXTY-SIX.

History. Dominoes are said by different writers to have been invented by the Hebrews, Greeks, or Chinese. They were introduced into France from Italy about 1750, and into England some years later. A domino was a black cloak or hood worn by monks, and some think the name of the game is derived from the fact that one side of the Domino is usually black. Other writers suggest that the game was allowed in convents, because it was so simple, and that the monks, on playing their last piece, said in Latin "*Benedicamus Domino*" (bless the Lord), which was afterward shortened into Domino. A story is told also of a monk who played the game against the commands of his superior, and for punishment was obliged to repeat a Latin psalm, and from the word *Domino* in it, he afterwards named the game; but all these derivations seem rather fanciful.

Domino Whist. See SEVENS AND EIGHTS.

DONKEY, a game played by any number of people, who try, blindfold, to fasten a tail on the picture of a tailless donkey. The picture, which is about four feet square, is pinned on the wall at one end of a room, and each player in turn, standing at the other end, is blindfolded and given a cloth tail and a pin with which to fasten it to the picture. He who first fastens the tail in the right place wins. This is a difficult feat, and the sight of the donkey covered with tails, some pinned to his head and others to his legs, creates a great deal of amusement. Donkey Parties are sometimes given, at which this game is the principal entertainment. The player is sometimes informed by the laughter of the company as to whether he is at the right place or not and hence may be guided to the proper spot, so sometimes the game is made more difficult by requiring him to pin the tail to the part of the donkey he touches first.

DOUBLE JUMP, a SOLITAIRE game of CARDS, played with one full pack. The cards are laid down in one long row. Whenever the player sees two cards of the same suit, or of the same value, separated by two other cards, he may take up the one toward the left, and place it on the other. This is called a double jump, since the two cards between are passed over. A jump brings new cards next one another and may give at once an opportunity for another jump. When the top card of a pile thus corresponds with another, two cards distant, the whole pile goes with the top card in its jump. The object is thus to bring all the cards into one pile. When but three piles are left, only one need be jumped, and when but two, one can be placed on the other if the top cards correspond in suit or value.

DOUBLE PENDULUM, Experiments with the. Suspend a small glass funnel by setting it in a hole in a board or flat cork about three inches in diameter, hung by strings as in the picture. These strings are united above the funnel at r . The whole arrangement is suspended from the ceiling or from a frame, by two strings, tied to hooks about four feet apart, and united below at the funnel. The funnel should hang as

Double Pendulum.

closely to the table as possible at its center. Tie the two supporting strings together firmly at one fourth their length from the funnel. Fill the funnel with sand, and then hold it at one corner of the table, stopping up the tube with one finger. Let it go and it will swing off in a curve, which will be marked on the table by the sand. Tie the strings in a different place and the curve will be different. By careful trial, many

curious curves can thus be traced. These curves are called Lissajous's curves, after the Frenchman who discovered them. They are the same that are produced in the experiment of VIBRATING RODS.

DOUBLETS, a writing game played by any number of persons. Two words of the same number of letters are first agreed upon, and each of the players endeavors to connect them by a column of other words called "links," each of which shall differ from the one before it by only a single letter. Thus "Cat" and "Dog" may be connected in many ways, of which two examples follow:

Cat	Cat
Cot	Pat
Cog	Put
Dog	Pug
	Dug
	Dog

The object of the game is to make as few links as possible. There are several methods of scoring. Thus, the player who makes the greatest number of links may score nothing and each of the others one point for each link less than this; or, the one who has the least number of links may score a number previously agreed on, and each of the others as many points less as he has less links.

The best plan in joining the doublets is to write them side by side and then work downward from each. Thus, suppose the words agreed on are Hand and Legs. When these are written side by side, it is seen that the H in Hand must be turned into an L, which is done by writing "Land." The G in Legs must become an N, so "Lens" is written underneath. The word "Lend" now completes the chain, which reads

Hand
Land
Lend
Lens
Legs

In this case, as in the first example

given, each link forms a step toward the desired end, every change being from one of the letters of the first doublet to the corresponding one of the second; but sometimes this is impossible. Thus if Chin and Head are the Doublets only one of the letters of either can be substituted at once for the corresponding one of the other. This is the N in Chin, which can be changed to D, so that the words stand:

Chin	Head
Chid	

Looking now at the word Head, it is seen that the letter E must be turned into H. The first letter of a word whose second is H, is likely to be S or T. Take the word Shed and it can be connected with Head as follows:

Head
Heed
Seed
Shed

After trying in vain to connect chid and shed the former link is rejected, and a new road tried. The first letter of chin is turned to S making Shin, and the connection is soon made as follows:

Chin
Shin
Ship
Shop
Shod
Shed
Seed
Heed
Head

The game of Doublets makes also an interesting SOLITAIRE game. The easiest doublets to connect are those in which the vowels in one correspond in position to vowels in the other, and consonants to consonants. The difficulty increases also with the length of the words.

Doublets was invented and named by the author of "Alice in Wonderland," whose assumed name was "Lewis Carroll." He wrote a book on the subject, giving many interesting examples of doublets connected

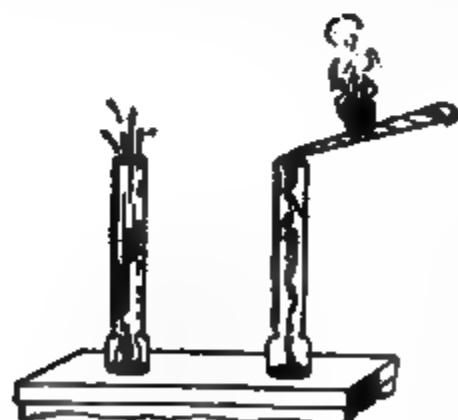
by links. It is said, however, that a similar game was played in this country before the appearance of this book.

DRAMATICS. See **PRIVATE THEATRICALS.**

DRAUGHTS. See **CHECKERS.**

DRAUGHTS OF AIR, Experiments on. 1. Open on a crack the door between a cold room and a warm one, and hold a lighted candle at various heights, close to the crack. No windows must be open in either room. At the top of the door the flame will be blown toward the cold room, and at the bottom toward the warm room. About half-way up there will be a place where the flame is blown very little, or not at all. The reason is that cold air, being heavier than warm air, flows into the warm room along the floor, and forces the warm air out at the ceiling. Instead of a candle flame, smoke from what is called "touch paper" may be used to show the direction of the currents. Touch paper is made by dipping unglazed paper in a solution of saltpetre. When dry, it burns with smoke but not with flame.

2. Cut in the top of a tight shallow pasteboard box two holes, each about an inch in diameter, and place over each an argand lamp chimney.



Experiment 2.

In one hole stand a candle cut to such a length that it will project about half an inch above the top. Light the candle, and then hold

burning touch paper over the other lamp-chimney. The smoke, instead of rising, will go down one chimney, and after it has filled the box will rise through the other. The reason is that the burning candle makes a draught up its chimney and if the box is tight so that no air can get in through cracks, to supply the place of what is going out, air must come down the other chimney.

3. Hold the hand tightly over the chimney where the draught is downward. The candle in the other chimney will begin to burn feebly



Experiment 3.

and smoke, and will go out if there are no cracks for air to get in. The reason air does not get to it down its own chimney is that the upward draught there is too strong.

4. Another way of trying Experiments 2 and 3, is to hang in an ordinary lamp chimney a partition cut out of tin, shaped as in the picture. The candle is set a little to one side of the chimney, and there is then an upward draught on one side of the partition, and a downward draught on the other. The candle may be put out as in Experiment 3.

5. Bore several holes through a board, and enlarge some of them at one end so that they will be conical in form. Suspend a square of paper, by a string, two or three inches from the board, and from the other side

blow through the holes at it. On blowing through a straight hole, the paper will be carried back, but on

the board when blown at through a conical hole. The reason is, that the breath is kept together in a stream by the straight hole, whereas it disperses to all sides in the conical hole, and carries with it some of the air on the other side of the board so that a slight return current is caused. This principle is used in ventilating rooms where it is desirable to avoid a direct draught.

6. Cut out a spiral like the one described in the article **FOURTH OF JULY**, and suspend it over a lamp

Experiment 5.

blowing through a conical hole from the small end, the paper will hang

Experiment 7.

as shown in the illustration. The up-rush of hot air will cause it to twirl.

7. A wheel cut out of paper in the shape shown above will also twirl in a draught of hot air, or when fanned as shown in the illustration.

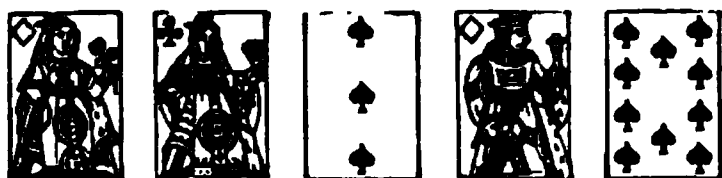
DRAW POKER, a game of cards, played by from two to six persons, with a full pack. Five cards are dealt to each, one at a time, and then each in turn, beginning at the dealer's left, may discard any or all of these, and call for as many new ones as he discards, which the dealer must give him from the top of the

Experiment 6.

perfectly still. If a lighted candle be used instead of the paper, the flame will even be directed toward

stock. This is called drawing. The player who holds in his hand the highest group of cards, after drawing, is the winner.

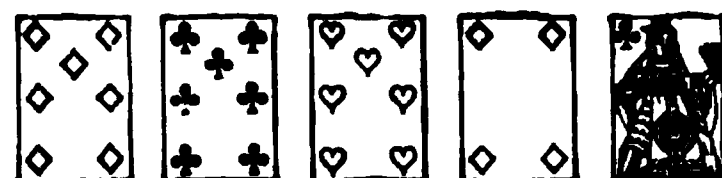
The groups are as follows, beginning with the lowest :



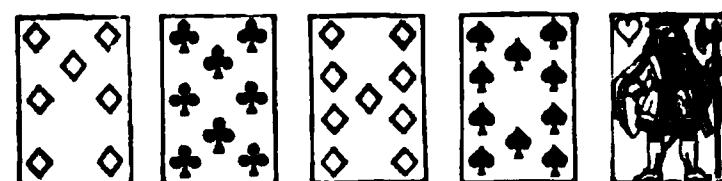
1. *A Pair*. Two cards of the same rank (accompanied, of course, by three other cards, as each player holds five).



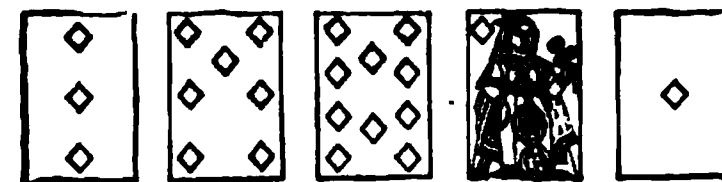
2. *Two Pairs* (accompanied by one other card).



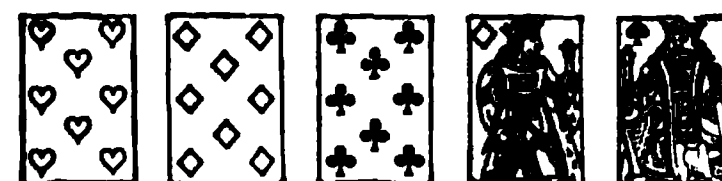
3. *Three of a Kind*, or a *Triplet*. Three cards of the same rank (with two other cards).



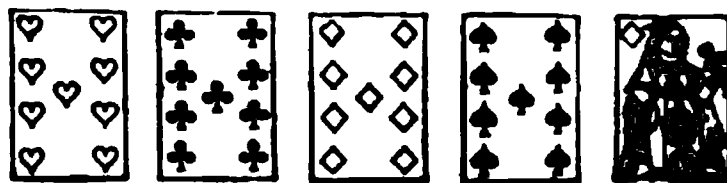
4. *A Straight*. Five cards in regular order, not all of the same suit. In counting straights, the ace ranks either below the Two or above the King, but must stand at the end. Queen, King, Ace, Two, Three is, therefore, not a straight.



5. *A Flush*. Five cards of the same suit, not in regular order.



6. *A Full House*, *Full Hand*, or *Full*. Triplets and a Pair together.

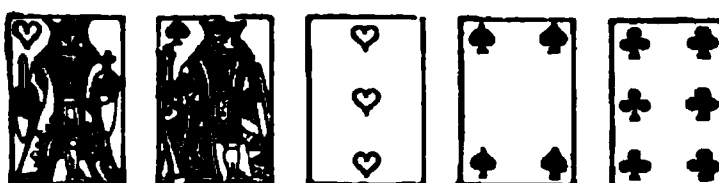


7. *Four of a Kind*.

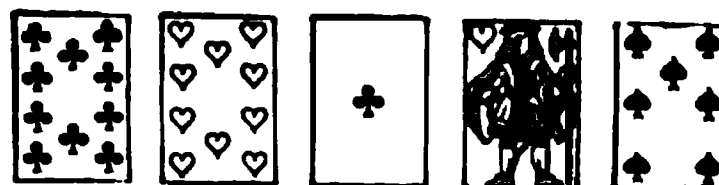


8. *A Straight Flush*. A Straight, with cards all of the same suit.

When Straights are not counted, as is very rarely the case, a Straight Flush ranks as a common Flush, and is beaten by a Full and by Fours. Of two groups of the same kind,



BEATS



that containing the highest card is the higher. If the two highest cards are the same, then the next to the highest decide the rank, and so on. If the groups be exactly the same, the other cards of the hand determine which shall win. When there is no group, the hand having the



BEATS

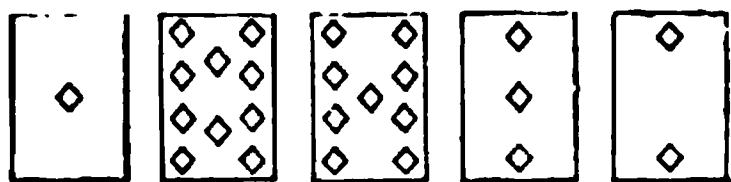


highest card wins, if the two highest are the same ; then two next highest, etc.

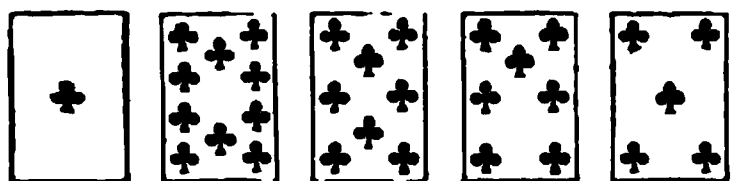
The score in Poker is kept with counters, or "chips," usually round, flat pieces of ivory or bone. There

are several methods, but the following is the simplest:

At the beginning of the game, the counters are divided equally among the players. Each, before looking at his hand, must put in the middle of the table a number of counters, agreed



BEATS

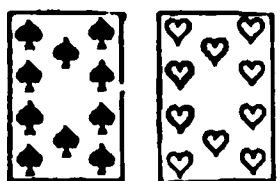


on beforehand, and which is the same for each hand during the game. This is called the "ante" (Latin *ante*, before), and the antes together form the pool. When the drawing is finished, the eldest hand may either say, "I stay out," in which case he takes no further part in the hand, or he may place any number of counters, up to a limit agreed on before the game commences, in the pool; more or less according to the strength of his hand. This is called his "bet." The player at his left may stay out, or he may place in the pool the same number of chips as his neighbor (which is called "see-



A pair of Kings.

BEATS



A pair of Tens.

ing"), or he may put in more (which is called "raising" or "going better"). The third player may stay out, see, or raise the second player, and so on, with each in turn, one or more times around, either till all but one of the players stay out, when that one takes the pool without showing his hand, or till all the players in the game have "seen" the one that raised last. In the latter case, they are said to "call" the player that made the last raise (or the eldest

hand, if no raise was made), who must then show his hand. If none of the others has a better hand, they let him take the pool without showing their hands; otherwise the higher hands are shown and the winner takes the pool. The game may be played a certain length of time, and when it is over he wins that has most counters.

Sometimes they who wish cards in the beginning of the game are required to add to their antes. Sometimes the players also make bets before they have drawn. Sometimes the ante is large or small, as the eldest hand chooses. A common method is to require each to ante twice as much as the eldest hand, who makes good the rest of the ante at his next turn, unless he stays out.

A player often bets high on a weak hand, in hope that the others, thinking he has a strong one, will prefer to stay out. This is called "bluffing." It is often possible to detect a bluff by watching a player's expression, unless he be very skillful at concealing his thoughts. The only part of Poker in which skill can be shown is in discarding. If a pair is dealt to a player, he should generally discard the other three cards, hoping to draw another of the same kind. If he hold four of a suit, he should often discard the fifth, hoping for a Flush. By noticing how many cards a player calls for, some idea may often be gained of the strength of his hand.

RULES OF THE GAME.

1. If any player be given more or less than five cards there must be a new deal, provided the mistake is noticed before that player looks at his hand; otherwise, the deal is good, and the player whose hand is wrong must stay out.

2. All the players must discard before cards are given to any one.

3. Discarded cards must be piled face downward in front of the next dealer, and must not be touched.

4. If any player be given more

cards than he asked for, the dealer must draw one of them and return it to the stock; but if the player look at his hand before noticing the mistake, he must stay out.

History. Poker is derived from *Primero* or *Prime*, one of the oldest card games, which was a favorite as early as 1500. It was played in various ways, but generally four cards were dealt to each player, and the principal groups were *Flush*, *Prime*, and *Point*. *Flush* was the same as in *Poker*, *Prime* was one card of each suit, and *Point* was reckoned as in *PIQUET*, but with different values for the cards. When a player "raised the ante" he was said to "vye." Shakespeare represents King Henry VIII. as playing *Primero* with the Duke of Suffolk. *Primero* was elaborated in France, in the 17th century, into *Ambigu*, in which the *Straight*, the *Straight Flush*, *Four of a kind*, and *Three of a kind*, were introduced. About this time a game called *Post and Pair*, derived from *Primero*, was played in the west of England, and from this came *Brag*, on which Hoyle wrote a treatise in 1751. In the game of *Brag* each player said "I brag," as he raised another player. Our *Poker* is simply the English *Brag* with variations.

DRIVING. The beginner should practice with a single horse. The driver in America sits on the right side of the vehicle, and if entering from the left should get in before his companion to avoid passing over or under the reins, which should always be in some one's hands unless an attendant be at the horse's head.

The horse should always be restrained from moving off until the driver gives him an indication to start. Many horses acquire the habit of starting when they hear any one get into the vehicle, from being struck with the whip by the driver as soon as he starts. The horse, expecting the lash, starts up to avoid it. To drive in the English style the driver should hold the

reins in his left hand, leaving the right free to hold the whip or to assist in turning or guiding the horse, or when a strong pull is necessary. The right rein, D, should be held between the first and second, or second and third fingers, and the left, N, between the forefinger and thumb, the ends passing through the palm of the hand under the fingers. (See Fig. 1.) The knuckles of the hand should be turned to the left. The horse is guided by pulling the rein on the side toward which he is to turn, which may be done by twisting the hand up or down, or by pulling the required rein with the right hand.

The reins should be held short enough to enable the driver to check the horse quickly without leaning

Fig. 1.

far back or taking a fresh hold, but not so short that he is obliged to lean too far forward or extend his arm awkwardly. The left elbow should be held well back and low down and the arm allowed to play lightly from the shoulder. The right hand is used to hold the whip and to steady and guide the horse. It is best for the driver to sit high, for this enables him to give a steady pull on the reins when necessary. To make the horse go faster, he should be encouraged with the voice, the whip being used only when necessary. The use of the whip depends a great deal on the horse; some animals will not bear it at all, while others can scarcely be made to go without it. Some horses will go best with a tight rein, and some with a loose one; but the driver should

always "feel" the horse's mouth. To stop a horse the word "whoa!" is generally used, the driver at the same time pulling steadily on the reins. All sudden starts and stops should be avoided, as the result is to give those in the vehicle an unpleasant jerk.

Driving a Pair. The horse on the right is called the off horse and the one to the left the near horse. These terms arose from the custom of the driver's walking on the left hand side of his team, whence the left horse was near him and the right one farther off. Most of what has been said above applies also to driving a pair, but in addition the driver must see that each horse does his share of the work, as some horses have a habit of shirking. The driver should watch the traces, and, if he sees that one of the team keeps his side loose, while the other's are tight, the offender should be touched with the whip.

Driving Tandem. Two or more horses are sometimes driven one in front of the other. The forward horse in this case is called the leader, and the one next the carriage the wheeler. A horse, to make a good leader, must be specially trained, otherwise he is apt to step over the traces or to turn around and face the wheel-horse. Tandem driving is the most difficult kind and should not be attempted by a beginner.

Four-in-Hand. Fig. 2 shows the method of holding the reins in driving four-in-hand. N L is the near leader's rein, O L is the off leader's, N W the near wheeler's, and O W the off wheeler's. Directions for driving four-in-hand cannot easily be given in print, but showing the method of holding the reins may be worth while. The guiding and steadying is done with the right hand as in pair horse driving.

Rule of the Road. When two vehicles meet, each turns to the right. In England the rule is to turn to the left, thus giving the driver

who sits on the right a full view of the vehicle he passes, so as to avoid collision. It may be that the opposite rule was adopted in America because when the country was newly settled, the roads were narrow and poor, so that it was more necessary for the driver to see to his outer wheels than his inner. It is always better for a beginner to turn too soon rather than to wait, for sometimes the vehicles are approaching each other faster than he thinks. If one of the drivers sees that the spot where the vehicles are likely to meet is bad for passing, he should stop at the right side of the road, and the other should then drive quickly past him, so that he will have to wait as short a time as possible. Care must be taken in turning corners, or in passing a cross-road, lest there be a collision. When a vehicle is overtaken, it should be passed to the left, unless it is a heavily laden wagon on the left of the road, and no other vehicle is approaching, when it may be passed on the right. If a vehicle overtake another in a narrow road, the forward one should either keep ahead, or, if the driver does not wish to do so, he should turn to the right and

Fig. 2.

let the other pass. If he does neither, the one in the rear should call to him and ask him politely to do one or the other.

Accidents. Collisions will usually be avoided if the above directions are followed. The other common accidents are runaways, and the giving way of some part of the harness.

The reader is referred to what is said of runaways in the article on RIDING. When a horse runs it is usually safer to remain in the vehicle than to jump out; many more people have been injured by the latter than by the former course. If a horse acts uneasy or stops without apparent rea-

Fig. 3.

son, it is very likely that something is the matter with the harness. In such a case the driver should alight at once and see what the matter is. If the

not to be had the check rein may be taken off and utilized, or the throat lash even may be useful.

Figs. 3 and 4 show two curiosities of driving, the first a proposed vehicle where the horse is beneath the cart; the second a proposed chaise to be run by a spring or other motor attached to the rear wheels.

DROP THE HANDKERCHIEF, a game played by any number of children, who stand in a ring, facing inward. One of the boys, chosen for the purpose, walks or runs around the outside of the ring, holding a handkerchief in his hand, which he drops behind some girl. As soon as she sees it, she must pick it up and run after him. If she catches him, they kiss, and she returns the handkerchief for him to drop again; but

Fig. 4.

harness breaks, it may usually be fastened with twine, so that it will hold till he can drive home, or if

if he can make the circuit of the ring and stand in the space she left, she must take his place. She then drops the handkerchief behind some boy, who runs after her, and the game goes on as before, a girl always dropping the handkerchief behind a boy, and a boy behind a girl. The player who drops the handkerchief may run around the circle in either way, and the one behind whom it is dropped must always follow in the same direction. Sometimes a player does not see that the handkerchief is lying behind him, in which case the dropper simply runs around the circle, picks up the handkerchief, and handing it to him, takes his place. No player may tell another, by word or sign, that the handkerchief is lying behind him. The player who drops the handkerchief sometimes says, as he runs around the circle,

"I dropped my handkerchief yesterday,

I found it to-day,

I list it, I lost it,

I threw it away."

DUCHESS OF LUYNES, a SOLITAIRE game of CARDS, played with two packs. The first four cards dealt from the pack are placed in a row, face upward, and the fifth and sixth are laid aside to form Stock. Four more are laid on the first four, and two more in the Stock, and so on till the pack is used. The player's object is to form eight piles of families, downward from four Kings, and upward from four Aces, following suit. For this purpose the top card of any pile may be used in course of play, or the top card of the Stock. But when the top card of a pile is used, its place is not supplied from the pack, the next card being placed where it would have been if the preceding had not been used. When the pack is exhausted, the Stock can twice be shuffled and relaid, and then Stock and piles can be shuffled and relaid in four piles, omitting the Stock.

DUCK, or DUCK ON THE ROCK, a game played by any number of

persons, each with a stone, about the size of a man's two fists, called a Duck. One of the players, chosen by lot, places his Duck on a stone with a smooth top, and stands near it, while the others take their position behind a line eight or ten yards distant, and try to knock it off with their Ducks, each in turn. As soon as each has thrown his Duck, he runs up to it and watches his chance to carry it back to the line. If the one whose Duck is on the rock can touch any of the others while carrying back his Duck, before he reaches the line, the one so caught must take the catcher's place, putting his own Duck on the rock. But if the Duck is knocked from the rock, its owner must replace it before he can touch any one.

In playing this game, if the owner of the Duck on the rock is skillful, he can often keep three or four of the other players out of the game by preventing them from picking up their Ducks. In this case the only means of relief is for some one to strike the Duck from the rock, for then its owner is helpless till he has put it back.

Emperor, a kind of Duck, in which a wooden figure called the Emperor is placed on the top of a post about 18 inches high. A player called the Prime Minister stands near it. The other players have each a wooden ball like a croquet ball. The game is played exactly like Duck, the players trying to knock the Emperor off his post by throwing or pitching balls at him. The game can be continued for a specified time, at the end of which he who has been Prime Minister the least number of times, or has hit the Emperor the greatest number of times, is victor.

DUCK AND DRAKE, or Skipping Stones, a game played by any number of persons, each of whom throws a flat stone into the water so that it will rebound. He whose stone skips the greatest number of times is the winner. The stone should be held

between thumb and forefinger and given a slight whirling motion so that it will strike the water with its flat side and not edgewise. The Greek boys played this game with flat shells or pieces of tile, and called it *epostrakismos* (Tile Skipping). In English, "to play at ducks and drakes," has come to mean spending one's money extravagantly.

DUMB BELLS. See GYMNASTICS.

DUMB CRAMBO. See CRAMBO.

DWARF, THE, an amusement in which two persons take part. One of them stands behind a table and places his hands on it, while the other stands behind the first and passes his arms around him as in Fig. 1. The head and body of the second person and the legs of the first are hidden by curtains, which is easily managed if the table be placed in a doorway. Shoes are

and the arms of the hidden player, and an excellent imitation of a dwarf is thus formed. (Fig 2.) The face should be disguised as much as pos-

Fig. 1.

then placed on the hands of the first player, and a child's trousers, or kilt skirt over his arms. A jacket is put on over his shoulders

Fig. 2.

sible, and the dwarf may be dressed fantastically to represent a Turk or Moor. A third person should act the part of exhibitor, giving a comic account of the dwarf's history. The dwarf may deliver a speech, appropriate gestures being made by the player who furnishes the arms. The gestures are apt to be ludicrous, as the second player usually has trouble in fitting his action to the words of the first. The dwarf can dance and perform many remarkable feats, such as rubbing his head with his toe, or putting both feet in his mouth at once.

E

EARL OF COVENTRY, THE, a game of CARDS, played with a full pack. All the cards are dealt. The eldest hand leads any card he

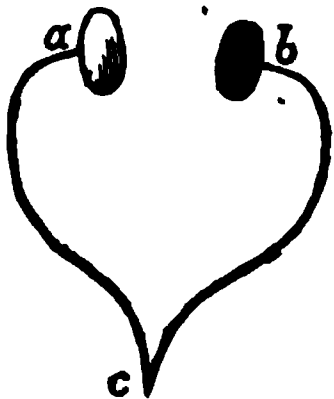
chooses, saying "There's a good King," or "There's a good five" (or whatever card it may be). The next player to the left who has a

card of the same rank plays it saying "There's another good as he." The third and fourth are then played in like manner, with the words: "There's the best of all the three," and "There's the Earl of Coventry." The player of the fourth card leads, and so the game goes on, the player who first gets rid of all his cards being the winner.

EARS, Experiments with the. 1. Let one person be blindfolded and sit in a chair, folding his arms. Let another hold two coins between the thumb and forefinger of the right hand, and put the left forefinger between them so that they will click together when the finger is suddenly pulled out. Let him thus make a click in various places near the blindfolded person, while the latter guesses the direction from which the sound comes. It will be found that he can tell easily so long as the sound is nearer one ear than the other, but whenever it is made in any spot equally distant from both, he cannot tell where it is.

2. Tie about three feet of twine at the middle to the knob of a poker. Twirl the ends of the twine around the forefingers, and stop up the ears with these fingers. If the swinging poker be knocked against the wall, or struck with anything, the person holding it will hear deep tones like those of a bell. If a silver table spoon be used instead of a poker, the sound of a higher-toned bell will be imitated.

3. Have a tinman solder two pieces of iron wire to two disks of tin, *a*, *b*, each large enough to cover the ear, in the shape shown in the picture. When the disks are pressed to the ears and the point *c*, where the wires join, is applied to any sounding body, the sound will be much magnified.



Experiment 3.

4. Let one person hold to his ears the ends of a piece of waxed thread six or eight feet long. Let a second person hold the thread stretched by its middle point and taking the two parts of the thread together between his thumb and forefinger, near the others' face, rub them along, keeping the thread taut. The result will be a sound like thunder in the ears of the first-named person. If the rubbing be with jerks, and sometimes done with the finger-nail, the sound of short, cracking thunder will be imitated.

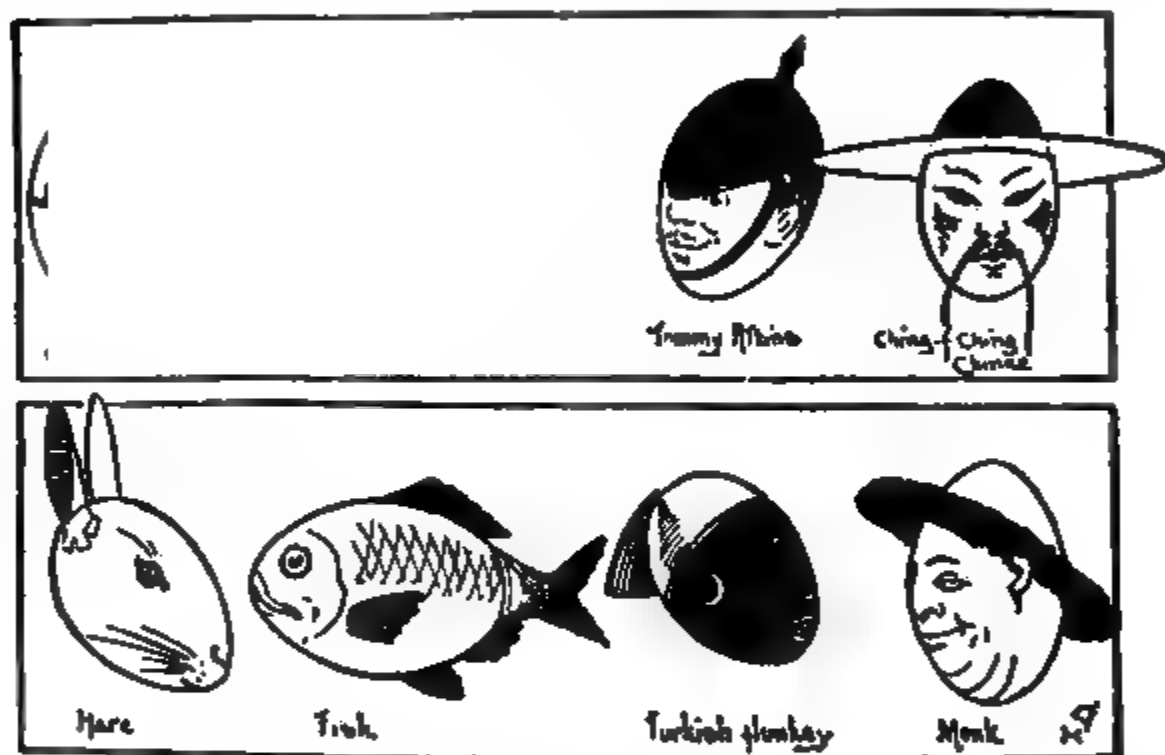
EASTER EGGS, colored and ornamented eggs, used as presents or playthings at Easter. The eggs, called also pasque, pace, or paas eggs, are usually colored by being boiled in dye, of which various colors may be bought at any druggist's.

An egg may be colored also in a pretty pattern by sewing it up tightly and smoothly in a piece of common calico, and then boiling it. If the calico be not of fast colors, the pattern will be reproduced on the egg shell. Eggs too may be gilded by painting them over with gum or varnish and then laying on gold leaf. The "gold paint" sold by druggists will produce a similar effect though not so brilliant. Colored eggs may be ornamented by drawing designs on them with tallow, or any greasy substance, before boiling. The dye will not color the parts touched by the grease, and the design will therefore appear in white. More delicate designs may be drawn by scratching with the point of a needle, or the blade of a penknife, after the egg has been dyed. If the eggs are boiled hard, they may be kept any length of time. If preferred, the eggs may be "blown" before they are dyed. This is done by making a small hole in each end, applying the mouth to one of them, and blowing the contents of the egg out of the other. The tallow design should be drawn before blowing, that the shell may not be broken, and care must

be taken not to crush it in dyeing. Egg shells may be engraved by drawing designs on them with melted wax, or varnish, and then dipping them in strong vinegar. The vinegar will eat away the shell except where it is protected by the wax, and when the wax or varnish is removed, the design will be in relief. Wax can be removed by scraping; varnish by washing with alcohol. If the egg be dyed before removing the wax, the design will be in raised white lines on a low colored ground. In this case

the vinegar must be washed off before dyeing.

The eggs may also be decorated by pasting little pictures, such as may be bought at toy stores, over the shells, and the eggs, when finished, may be placed in little nests of moss and twigs. They are sometimes served in a tin pan filled with sand, in which the eggs are buried. This is often called an "ostrich nest." Blown eggs may be strung on ribbons and hung up for ornaments. One way of playing with the



Quaint Easter Eggs.

eggs is for some one to hide them in different parts of the house on the evening before Easter, and for the rest of the family to look for them. They become the property of those who find them.

In some parts of England and Holland, and in many places in this country, especially the parts settled by the Dutch, the cracking of pasque eggs is a common sport on Easter Monday. One person holds his egg, the small end upward, in his hand, and lets another try to break it by striking his downward upon it. Af-

ter several taps, one generally breaks; the cracked one belongs to the victor, who keeps on trying other eggs until his own is broken. A small, sharp-pointed egg is generally best for this sport, and sometimes one egg will break a dozen others before giving way itself. In Washington, in the White House grounds, children play games with their Easter eggs by rolling them down hill. Two roll their eggs together, and he whose egg is unbroken takes the other, if it is cracked. Sometimes several thousand children play thus at one time.

Egg-rolling on Easter is also common in Germany, where tracks of sticks, laid side by side, are made for the eggs. The sport begins at midnight on Easter-even, and lasts till about three o'clock in the morning. Not only eggs, but apples also, and little cakes, are used. In Bohemia, children roll many eggs in a row, letting them start all at once, to see which will reach the bottom of the hill soonest. In the north of England, Easter eggs are also played with like balls, by tossing them up in the air.

In Germany a number of eggs are placed in a basket and one person tosses them, one by one, into another basket filled with soft shavings, while another runs to a spot agreed on, and back again. He who does his task the sooner wins the eggs.

In Ireland, the game we call "GO BANG" is played by sticking eggs in the sand. It is there called "Bunching Eggs."

Easter eggs are sometimes dressed as dolls, faces being marked or painted on them. They may be made also into other quaint shapes. (see illustration). Artificial Easter eggs, some of them large and filled with candies, may be bought at confectioners.

History. The custom of Easter eggs is very old, and is thought by some writers to be derived from the ancient Egyptians, who regarded eggs as a sacred emblem of the renewal of mankind after the Deluge. The early Christians seem to have regarded eggs as symbols of the resurrection of the dead, since the chicken escapes from the shell as from a tomb. In old times as many as twenty dozen richly decorated eggs were piled on one dish and kept on the table during Easter week. Every one who came to the house was invited to eat an Easter egg with the host, and it was considered impolite to refuse. In Spain and Italy public sports with eggs formed part of the Easter festivities.

In Russia, people call on their friends on Easter, as we do on New Year's Day, and exchange eggs with them. In Persia, a festival of eggs is celebrated on New Year's Day.

ECARTE (a-car-táy), a game of CARDS played by two persons, with a EUCHRE pack. The cards rank as usual, except that the Ace comes between the Knave and the Ten, instead of above the King. Five cards are dealt to each player, three and two, or two and three at a time, and the top card of the stock is turned up as trump. Should it be a King the dealer scores one. If the non-dealer is satisfied with his hand, he leads at once; if not, he says, "I propose," or sometimes, "Cards," meaning that he wishes to exchange part or all of his hand. The dealer may say "I refuse," in which case play begins, or he may say "I accept," and then each lays aside as many cards, face downward, as he wishes to exchange. Putting aside the trump, the dealer first gives his opponent as many cards from the stock as he has discarded, and then does the same to himself. If the non-dealer is still dissatisfied, he may propose again and again, until he gets a hand that suits him or until the dealer refuses.

Before play begins, if either player holds the king of trumps, he says "King" and scores one point. The non-dealer now leads, and the cards are played, suit being followed if possible. The second player in a trick must always win it if he can, and, if he can do so in no other way, he must trump.

The player who wins either three or four tricks is said to gain the *point*, and scores one. If he win all five, he gains the *vole* and scores two. If the elder hand play without proposing and fail to gain his point his opponent scores two, whether he make point or vole. In like manner, if the dealer refuse, and fail to gain his point, his opponent scores two. This applies only to the first pro-

posal and refusal of a hand. After one discard there is no penalty for playing without further proposal or for refusing a second proposal. He who first makes five points wins the game.

The hands which should be played without proposal are called *Jeux de Règle* (regulation plays), and are learned by heart by skillful players.

They are as follows :

1. All hands with three trumps.
2. Hands with two trumps, that contain also three cards of a suit, or any three cards whose average value is high.
3. Hands with one trump which contain also King, Queen, and Knave of a suit ; four of a suit, one being King ; three of a suit, one being King or Queen, and the fifth card being a Queen.
4. Hands with no trump, which contain four face cards or three Queens.

Good players rarely lead trumps in Écarté unless they have three or more, and the *Jeux de Règle* are therefore based on the number of trumps and not on their value, since a low trump is as good as a high one for trumping in. It will be seen that aside from the number of trumps, the *Jeux de Règle* depend first on the value of the other cards in the hand, and, secondly, on whether they are all of one suit or not. Similar reasons should decide the dealer to refuse a proposal. But a player with the King of trumps in his hand, with other cards that make him certain of winning his point, should propose for one card ; for there is a chance of the opponent refusing, and then he would gain two points instead of one. Usually, good players discard at least three cards at first, when they propose, and throw out all except trumps and Kings.

Since the trick must be won, if possible, it is usually good play to lead the highest of the strongest suit, that the opponent may be

forced to trump. A skillful player changes his method of play according as he wishes to make only a point or the vole, or sees that he cannot make the point and wishes to prevent his adversary from making the vole. In the last case he tries to make one trick, rather than risk anything for the chance of taking more.

More may be risked when the dealer is within one of going out, since it then makes no difference whether he make one point or two.

RULES OF THE GAME.

1. If there be a misdeal or any of the non-dealer's cards be exposed, he may call for a new deal.
2. If a player omit to announce the King of trumps before playing his first card, he loses the right to announce it.
3. A proposal or refusal cannot be taken back, nor can more cards be taken than the number first announced.
4. Discards must be placed face-downward on the table and cannot be looked at afterwards.
5. If either player take more or less cards than he discards, or if the dealer give more or less than were asked for, his opponent may demand a new deal. If he choose, he may correct the number by drawing a card from the hand if it is too large, or by adding to it from the stock, if it is too small.
6. If the dealer accept when there are not enough cards in the stock to give each as many as he wishes, the non-dealer is entitled to all he has asked for ; or, if there are not enough, to as many as there are left.
7. The dealer may accept on condition that there are enough cards for both.
8. If a card be led in turn, or be played to, it cannot be taken back.
9. If a player revoke, or fail to win the trick when he is able, his opponent may require the hands to be played again.
10. An omission in the score must

be corrected before the next trump is turned.

History. Écarté is a French game, and gets its name from the verb *écarter*, to discard, from the privilege given to the players of discarding cards from their hands. It is said to be a modification of Triomphe, which gave rise also to Whist. Some say that the game, taken to Louisiana by the French, was the origin of the American game of Euchre.

ECHO, a game played by any number of persons, one of whom is chosen to tell a story, and the others take the names of various characters or objects that are to be mentioned in it. When the story teller mentions the assumed name of a player once, that player must repeat it twice, and if it is mentioned twice in succession, it must be repeated once. Any player who does not echo his name, or who repeats it the wrong number of times, must pay a forfeit. The object of the story teller is to make his story so entertaining that the players will forget to echo. If the story is to be about a fight with a wolf, for instance, the names assumed by the players might be hunter, gun, powder, bullet, knife, cave, rock, tree, etc.; or if a shipwreck is the subject, the names might be ship, captain, mate, mast, sail, tiller, keel, passenger, wave, wind, etc. This game differs little from that of STAGE COACH, where the players rise and turn around when their names are mentioned, instead of echoing them.

ECHOES, Experiments on. Echoes are caused by the reflection of sound from some object, as the side of a house, a rock, or a hill.

1. To measure the distance of the object which produces the echo. With his watch in hand, let a person shout a single short syllable, as "Ha!" or "Oh!" and count the number of seconds before it returns. As sound travels about 1125 feet a second, the number of seconds multiplied by 1125 gives the distance traveled by the voice in going to the object and

back, and half of this is the distance of the object causing the echo. If the echo is returned by an object only a few hundred feet away, so that the time is only a fraction of a second, the following method should be employed. Call out "Ha!" and repeat the word just as you hear the echo, being careful to pronounce the syllable just with the echo and not after it. This will be possible with a little practice. Do this ten or twelve times, observing the number of seconds between the first call and the last echo. Suppose that this was seven seconds and that the syllable were called ten times. Then each echo took seven-tenths of a second, and the distance, found as before, is about 394 feet.

EQGS, Experiments with. 1. Take two eggs of the same size, one raw and the other hard-boiled. Suspend them to nails or gas-fixtures by fixing an elastic band around each, lengthwise, and fastening a string to the band at one end of the egg. The bands should be broad enough to clasp the egg firmly. Twist the strings to the same degree, and then allow them to untwist at the same time, so as to cause both eggs to spin around. The hard-boiled one will continue to do so for some time, but the raw egg will soon stop. The reason is that the contents of the latter are liquid and not connected with the shell. Only the shell is set twirling by the untwisting string, and the friction of the mass inside soon stops it.

2. Spin on a plate the same eggs used in Experiment 1. The hard-boiled egg will spin easily and is easily stopped. The raw one is hard to set spinning, but after it has once begun, if the egg be stopped by placing the palm of the hand on it, it will start spinning again as soon as the hand is removed. The reason is that, though the shell is stopped, the liquid interior of the egg keeps up its motion and starts the shell again as soon as it is released. The egg

will sometimes begin thus to spin again after it has been held several seconds.

3. Make a strong brine of salt and water and it will be found that an egg will float on it. Try to float the egg in pure water, and it will sink to the bottom. Now, pour brine through a glass funnel to the bottom of the vessel, and the water and egg will both rise, floating on the brine. When the vessel is full, the egg will be suspended just between the brine and the water, half of it in each.

4. Shake an egg till the membrane inclosing the yolk is broken. The yolk will sink below the white, making the lower end heavier, and the egg will then stand on end without aid. Columbus is said to have puzzled some wise men for a long time by telling them an egg could be stood on end. After they had tried to do it in vain, he showed them how, by breaking the shell a little by tapping the end on the floor. But if he had known this experi-

mouthed water-bottle, with a neck a little smaller than the egg. Thrust into the bottle a burning piece of paper, and a moment later place the

Experiment 6.

egg, end down, in the mouth of the bottle. It will be forced into the bottle by the pressure of the outside air, that within having been rarified by the heat of the burning paper.

6. Take two egg-cups of the size intended for holding the egg to be eaten from the shell. Stand one on a table in front of you, and the other just beyond it. Blow suddenly and smartly where the egg and cup touch, directly in front of you. With luck, your breath, added to the air under the egg, will lift the egg and tumble it over into the second cup.

ELECTRIC BATTERIES, Experiments with. Some electric batteries are described in the article Electricity, in C. C. T. The most common kinds can be bought, ready made, of dealers in telegraph supplies. The following experiments will aid in understanding their working:

1. Fill a glass three-quarters full

Experiment 5.

ment, he could have done it without even breaking the shell.

5. Remove the shell from a hard-boiled egg, and select a wide-

of water, and mix with water the about two tablespoonfuls of sulphuric acid. Put into the glass a strip of copper and a strip of zinc, each about three or four inches long and an inch wide. Bubbles of HYDROGEN begin to rise from the zinc, as in the experiment in making that gas. No such bubbles rise from the copper, because the acid does not act on it. Now touch together the tops of the two strips. Immediately most of the bubbles rise from the copper instead of the zinc, because an electric circuit has been completed; a current flows through the acid from the zinc to the copper, and the bubbles are attracted to the latter in a way that cannot be explained here. They are still caused by the acid acting on the zinc, not on the copper; for if the strips are left in the liquid long enough the zinc, not the copper, will be eaten away.

2. Take the zinc from the liquid, or dip a fresh piece into the liquid for a few seconds, to clean the surface, and then rub a little mercury over it, making it look bright and silvery. Repeat Experiment 1, and no bubbles at all will rise from the zinc, whether it touches the copper or not. If it does not touch the copper, neither will be eaten away by the acid; but if the two touch, the zinc will be eaten away as before. Zinc thus prepared is said to be amalgamated.

3. Instead of touching the zinc and copper together, touch one end of a wire to one of them, and the other end to the other. No matter how long the wire is, as soon as they are connected by it, bubbles will begin to rise from the copper. In this case the wire forms part of the electric circuit. Take two wires, each twenty feet long or so, and touch one end to each metal. Let another person go into an adjoining room, and there touch together the other ends of the wires. When he does so, bubbles will rise from the copper. It is pos-

sible, by arranging signals, to make thus a sort of TELEGRAPH.

4. If the two ends of the wires be attached to a GALVANOMETER (arranged for use with a strong current), the turning of the needle will show that electricity is passing through it. If a nail be wrapped in a piece of paper, and the wire wound about it a dozen times, the nail will be found to be a MAGNET while the current is passing.

5. Keep the wire connected with the galvanometer and it will be seen that the needle is turned less and less, until finally it almost comes back to its north and south position, showing that the current is growing weaker. If this does not happen before one piece of zinc is eaten away, replace the first with another piece. There are two reasons why the current grows weaker. First, the acid is used up; and secondly, the copper gets covered with bubbles of hydrogen, which stick to it.

6. In like manner try strips of various metals first in one liquid and then in another. It will be found, by using the galvanometer, that almost any two metals, immersed in any acid or salt liquid, give an electric current, which is generally more powerful if one of the metals is strongly acted on by the liquid and the other not.

Gravity Battery. This is the easiest effective battery to make.

Gravity Battery.

Take a glass preserve-jar, and bend

astrip of zinc into a cylinder half as high as the jar, and just small enough to slip into the mouth. The zinc must be amalgamated either before or after the cylinder is made. With a pair of pliers bend the zinc outward in various places around the top of the cylinder so that it will catch on the edge of the jar and hang in it. Then take a sheet of copper small enough to lie flat in the bottom of the jar, and a piece of copper wire about a foot long, covered with India rubber, or some substance resembling it. This can be bought of a dealer in telegraph supplies, but if none is at hand coat the wire by dipping it in melted wax three or four times. Wire insulated with silk will not do. Scrape away about two inches of the coating, make a hole in the edge of the copper, and insert the wire, bending it over and hammering it down to make a good connection. Put into the jar crystals of sulphate of copper (blue vitriol), broken into pieces as large as hazel nuts, making a layer about half an inch thick. Lay the copper plate flat on this layer and then put in about two inches more of the sulphate. Put the zinc cylinder in place and bring the coated wire from the copper through its inside. Fasten another wire to the upper part of the zinc. This wire need not be insulated. The wire attached to the copper is called the positive wire of the battery, and the other the negative wire. When the battery is to be used, the jar is filled with water, and a little sulphuric acid or common salt is put in to start the action. This battery will work steadily for months, only requiring to be filled up with water as fast as it evaporates, but it must be kept still and not shaken. It can be bought ready-made in various forms, one of which, used by the Western Union telegraph company, is shown in the illustration.

Another form of this battery is made by laying the copper plate on

top of the sulphate of copper and covering it with a layer of clean sand or sawdust about an inch and a half thick.

The gravity battery does not become weaker and weaker, because as fast as the sulphate of copper in the water is used up more of it is dissolved from the layer in the bottom. Instead of bubbles of hydrogen, a thin layer of copper is deposited on the copper plate, which of course does not hinder the working of the battery. Sulphate of zinc is produced by the eating away of the zinc, but it dissolves in the water, floats on the heavier solution of sulphate of copper and does not interfere with it. For this reason the name "Gravity" is given to the battery, because in it the two liquids are separated by their weight. In the second form described, the sand aids in keeping them apart.

Grenet Battery. This is made of plates of zinc and gas carbon in a mixture of sulphuric acid and bichro-

Grenet Battery.

mate of potash. The cells are usually made like bottles with wide necks, and hence it is often called

the "bottle battery." The zinc is so made that it can be pulled up out of the liquid with a rod, when not in use. The liquid, which is used in some other batteries also and is often called "battery fluid," is made as follows: Dissolve two pounds and a quarter of bichromate of potash in one gallon of warm water and when it has cooled add a pint of sulphuric acid. It requires renewing from time to time. The Grenet battery is very strong when the fluid is fresh. It weakens somewhat soon afterwards, and then keeps steady for many weeks, provided it is not used continuously.

Leclanche Battery. These cells are generally sold as square glass bottles G having in the middle a rod C of carbon packed in a mixture M of various substances, and in one corner a rod of zinc Z. The carbon rod has fastened to its top a copper

months without attention, but can be used only for a few seconds at a time. It weakens rapidly, but recovers just as rapidly when not in use.

Bunsen Battery. A rod of carbon is contained in a porous earthenware cup filled with nitric acid, and this, in turn, is placed in a glass jar of

Bunsen Battery.

sulphuric acid diluted with about four times its volume of water. A zinc cylinder surrounds the porous cup. The nitric acid gives off disagreeable fumes, so this battery is not pleasant to use, though one of the strongest known. The fumes may be lessened by putting nitrate of ammonium into the acid, or, for the acid the "battery fluid" used in the Grenet cell may be substituted. The Grove battery differs from the Bunsen only in having a platinum plate instead of the carbon rod.

Uses of Different Batteries. The Gravity battery can be used for almost any purpose. The Grenet gives a good current for a short time, the Leclanché is used where the current passes for only a few seconds at a time, as in electric bells, and the Bunsen where a very powerful continuous current is wanted, as in electro-plating.

It is not necessary to use insulated wire in making connections about the batteries, but it is better to do so, because otherwise, when two wires happen to touch, they will make a connection which is not wanted. Ordinary copper wire can be cut with a strong pair of scissors. Wire is sold in numbered sizes, whose di-

Leclanché Battery.

cap L to make the connections more easily. The bottle is filled with a strong solution of sal-ammoniac in water. This battery lasts many

ameter is shown by the accompanying picture of a wire gauge. There are various ways of fastening wires to the battery-plates and to each other. The simplest is to make a hole in the plate with an awl, insert

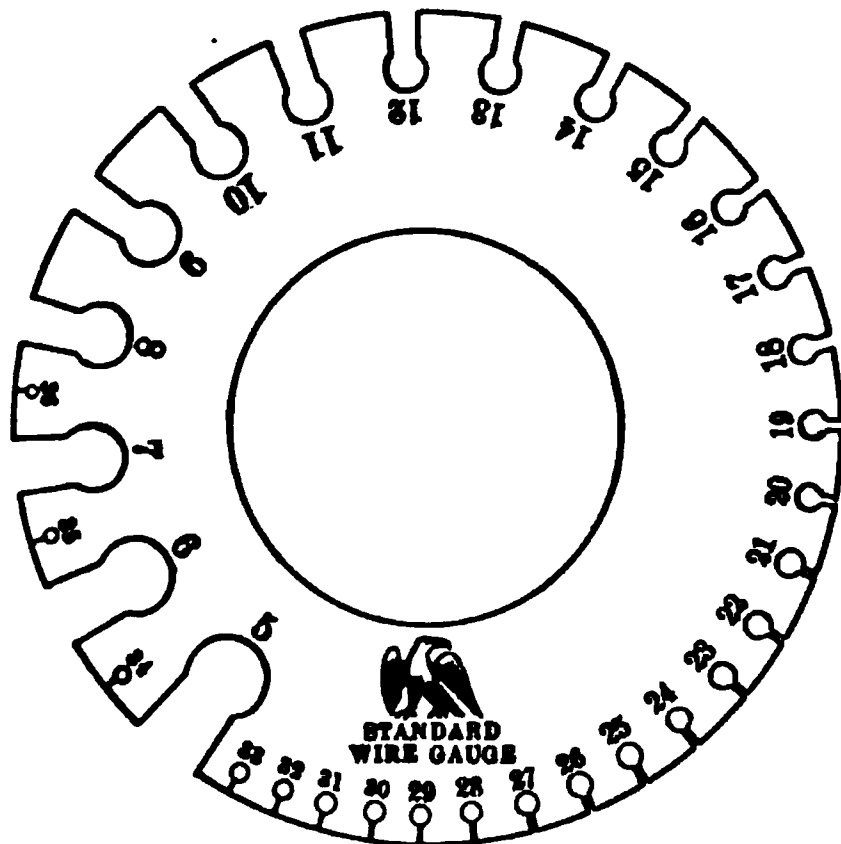
plates should be scraped bright with a knife wherever connections are made. Brass "binding screws" for making connections are sold by dealers in telegraphic supplies and are very convenient. They should be screwed up tightly. Much depends on making good, tight, clean connections, and too much care cannot be taken with them.

Whenever zinc plates are used they should be amalgamated frequently. To see whether the task has been properly done, immerse the plate for a minute in the acid, and if any bubble arise from it, the amalgamation, in the spot where it appears, is not perfect.

When a battery is quite strong it may be tested, to see if it is in working order, by holding one wire against a common file, and drawing the other quickly over the rough surface. A stream of sparks

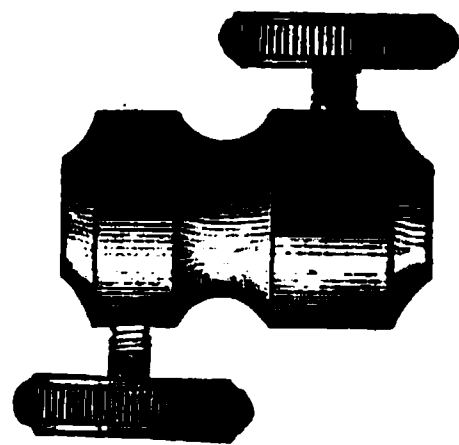
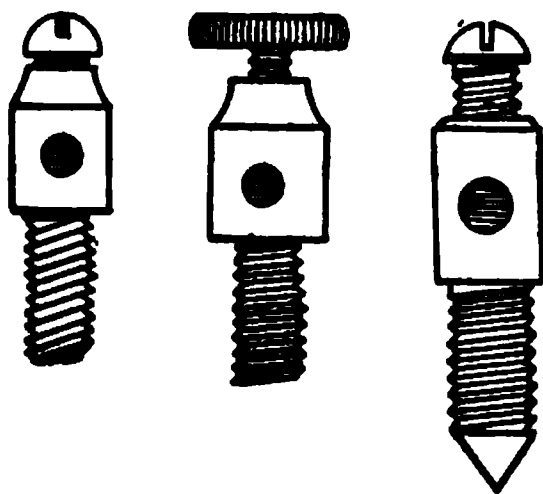
will fly from the file if the current be good.

Connections. One jar with its plates of metal and liquid is generally called a cell or element. The power



Wire Gauge.

the wire, bend it over, and hammer it down tight. To fasten one wire to another simply twist each around the other and hammer or pinch them together with pliers. Wires and



Binding Posts and Screw.

of a battery is different according to the way in which its cells are connected. They may be connected "abreast," or "tandem," or in a combination of the two. What this means will be understood by looking

at the diagrams. In Fig. 1, where the cells are connected "tandem," every copper plate of one cell is joined to the zinc of the next, leaving one zinc unconnected at one end and one copper at the other, between which

is the telegraph wire or whatever the current is to pass through. In Fig. 2, where the cells are "abreast," all the zincs are connected together, and

all the coppers. In Fig. 3 the cells are in two sets, the three cells in each set being abreast and the two sets tandem. In Fig. 4 the cells in each

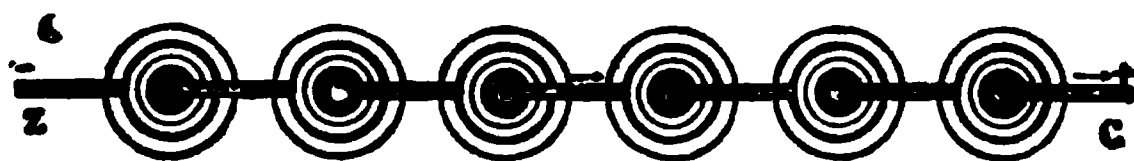


Fig. 1.

set are tandem and the two sets abreast. In each of the figures the zinc is marked Z and the copper C, and the direction of the current is shown by arrows. Which of

clock face. Around this wind one of the wires from the battery so that the end will project three or four inches horizontally. Bend about an inch at the end, at right angles. By

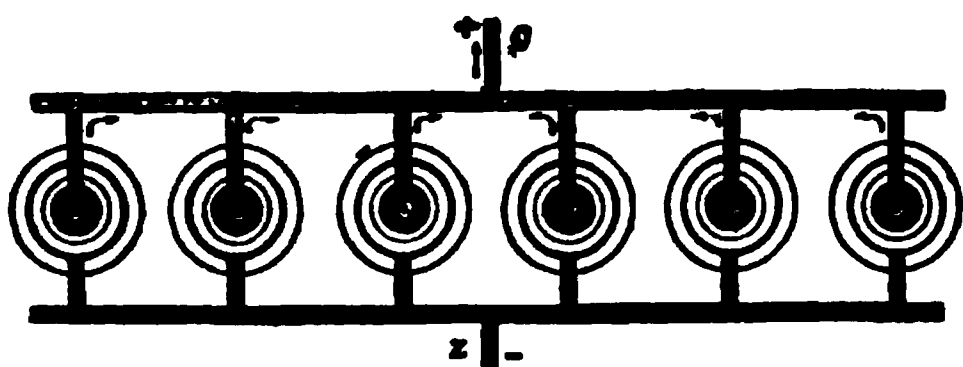


Fig. 2.

these arrangements gives the strongest current depends on the resistance it has to overcome. Where this is very great, as in electroplating, or in the electric light, the tandem arrangement is best; but when it is small, the other is best. The exact arrangement can always be calculated by expert electricians, but for a beginner the best plan is to find it out by trying various ways.

ELECTRIC CLOCK ALARM. Any clock may be simply fitted with an alarm which will ring by electricity. The alarm is an ordinary electric bell, which may be bought of a dealer in electric supplies. The battery to operate it may also be bought or may be made (see **ELECTRIC BATTERIES**).

In a block of wood fix an upright piece of thick iron wire, so that it will stand as high as the top of the

hour hand will strike it. The other battery wire is connected with one of the wires of the bell, and the other bell wire with any of the metal parts of

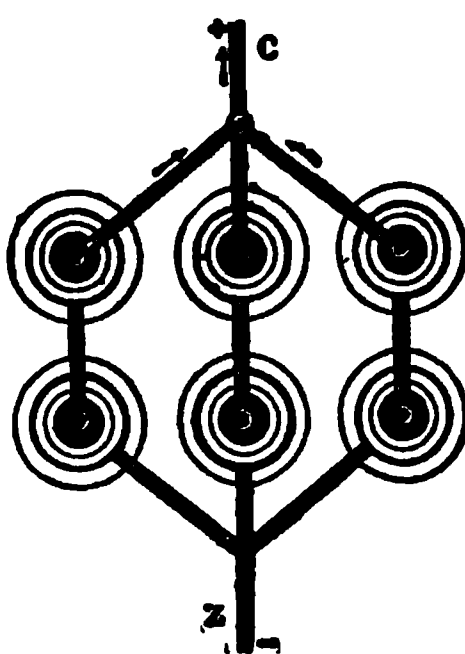


Fig. 3.

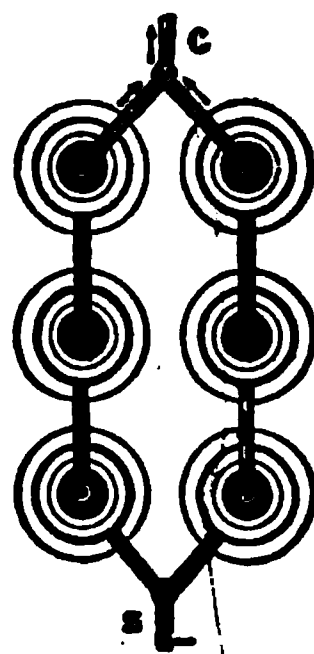


Fig. 4.

the clock. When the hour hand reaches the desired hour it touches the bent wire, and the current, passing, rings the electric bell. The

bent wire must then be removed, so

former is broken, and then close the circuit. The needle will move in the same direction as when the coil was approached. Open the circuit again. The needle will move as if the coil were taken away. To open and close the circuit quickly a "key" may be used made as described under TELEGRAPH.

3. Connect the large coil with the galvanometer and the small one with the battery and repeat all the foregoing experiments. The results will be the same.

4. Instead of the coil attached to the battery, use a strong bar magnet. When it is thrust into the coil the needle will move one way, and when it is removed it will swing the other way. If the opposite pole be used, the direction of these swings will be reversed. Some think the reason the magnet behaves exactly like a coil of wire with a current passing through it, in this and other cases, is that each particle of iron in the magnet has a little electric current running around it.

In this last experiment a little dynamo-electric machine was made, on exactly the same principle as those which furnish the currents for the electric lights in our streets. In the large dynamos electro-magnets are used, and the coil moves instead of the magnet.

ELECTRICITY, FRICTIONAL. Experiment: with. Frictional electricity, or electricity produced by rubbing, is described in C. C. T. under ELECTRICITY. The experiments which follow should be tried in a perfectly dry room. Moisture in the air always lessens the effects and often entirely prevents them.

Experiments.—1. Warm a rubber comb and then rub it briskly for a few seconds with a silk handkerchief or woolen cloth. It will then attract small, light objects, such as bits of paper, feathers, or wool. The best plan is to tear paper into bits about a quarter the size of the little finger nail, and hold the comb over a

Electric Clock Alarm.

that it will not obstruct the hour hand.

ELECTRIC INDUCTION, Experiments on. 1. Wind insulated wire in five or six layers around a large spool, or around a roll of pasteboard half an inch in diameter, and wind a similar coil on a roll large enough to slip over the first. Connect the ends of the first to the wires of a GALVANOMETER, and those of the second to an electric battery. Suddenly slip the larger wire over the smaller and the galvanometer needle will move to one side but will quickly come to rest again. Pull the coil away suddenly and the needle will move to the other side. The reason is that when a wire through which a current is passing is moved nearer another wire or is pulled away from it, a current, called an induction current, passes in the second wire while the first is moving; the induction current varies in direction according as the wires approach or recede; and this is why the needle moves in opposite directions in the two cases.

2. Place the larger coil around the smaller one while the circuit in the

pile of them, bringing it gradually nearer until the paper flies up to it. After each bit has clung to the comb for some time it will drop away. Try the same experiment with a glass rod and a stick of sealing wax. Cut little figures out of tissue paper and place them beneath a sheet of glass held by books as shown in the illustration. By rubbing the top of the

3. Try the same experiment with the glass rod.

4. Rub the glass rod with silk, and when it has driven the ball away, present to the ball the comb rubbed with flannel. It will attract the ball. The reason is that glass rubbed with silk has on it positive electricity, while the comb rubbed with flannel has negative electricity.

5. When the pith ball is repelled, present to it the flannel with which the comb was rubbed and it will be attracted. This is because the rubbing cloth always has on it the kind of electricity opposite to the substance rubbed.

6. Rub the glass rod with flannel and then with silk, and it can be seen by using the pith ball, as above, that its electricity is different in these two cases.

7. Hang the glass rod in a sling or stirrup of wire, suspended by strong sewing silk. Rub it with silk and then present the silk to one end. It will be attracted by the silk, for the reason given in Experiment 5. Present to it another glass rod rubbed with silk. It will be repelled.

8. Take a large, strong sheet of drawing paper, heat it thoroughly, and lay it on a wooden table. Rub it with a piece of woollen cloth till it sticks to the table, and then place a bunch of keys in the middle of the paper. Raise the paper by two corners and let some one present his finger to the keys, when a bright spark will pass from one to the other. In dry weather, with careful heating and handling of the paper, the spark may be nearly an inch long.

9. Electrify a toy rubber balloon by striking it with a piece of flannel, or a catskin. When so electrified, it can be made to stick to the wall or ceiling. Two electrified balloons suspended from the same point will repel each other and hang at an angle.

10. Seal a platinum wire in one end of a glass tube by holding the wire in the tube and turning it about

Experiment 1.—Electric Dancers.

glass with flannel they may be made to jump up and down.

2. Make two balls, the size of a pea, of pith or paper, and hang them with sewing silk to pins on the edge of a shelf. Present the comb or glass rod to one of these. It will first be attracted, and after clinging to the rod for a while will fly away. Soon after it will be attracted again, and so on. The reason for this is that the comb has on it only positive electricity. It therefore attracts the negative electricity in the pith ball, but when the ball has clung to the comb a short time its negative electricity unites with some of the positive electricity on the comb, leaving only positive, which is repelled by that on the comb.

in the flame of a spirit lamp. Touch the end of the wire to an ELECTROSCOPE, and pour warm mercury into the tube drop by drop. The bits of gold leaf in the electroscope will fly apart, showing that the friction of the mercury on the glass has developed electricity.

The article ELECTRIC MACHINE tells how to produce larger amounts of frictional electricity, and the article LEYDEN JAR tells how to collect it in quantity.

ELECTRIC LIGHT. The simplest arrangement for producing the arc light is as follows: Procure two rods of gas carbon, such as are used for street electric lights (see figure).

These may be bought of a dealer in electric supplies. Around the middle of each wind five or six times a piece of copper wire several inches long, so as to leave free about three inches at each end of the wire. File one end of the wire to a point and fix it firmly in the board which is to form the base of the light. Insert the other end in a binding post screwed in the same board. The rod is thus supported horizontally about two inches above the board. Fix the other rod in the same way, with its end just touching that of the first rod. On the other end of each rod slip a piece of rubber tubing two inches long so that the rods can be handled when the current is passing. The spiral of wire around each rod should be tight enough to hold them lightly together, but loose enough so that the rod can be moved backward and forward with a twisting or screwing motion. The end wires of an electric battery are now connected to the binding posts. The more powerful the battery the stronger will be the light, but at least from 20 to 40 Bunsen cells

Carbon
Rod.

must be used. As soon as the current passes through the rods of carbon they will fly apart a little way and the electric light will appear between them. After a little time they burn away, so that it is necessary to push them nearer, by taking hold of the part protected by the rubber tubing.

To produce the incandescent light, pass the current of an electric battery through a fine platinum wire an inch long. It will be heated and give off light. This shows the principle of the incandescent light. The lights commonly in use have a slender charred thread instead of wire, and are surrounded by a globe from which the air has been removed, so that the thread cannot burn away.

ELECTRIC MACHINE, a machine for the production of FRICTIONAL ELECTRICITY. A simple one may be made as follows. Bore a hole in the bottom of a smooth glass jar, by using a broken rat-tail file kept wet with turpentine. Fit a cork or wooden stopper in the mouth of the jar, bore a hole in the middle, and through this and the hole in the bottom of the jar fit tightly a wooden axle. Both holes must be exactly in the middle, so that the jar will revolve evenly when the axle is turned. Nail an upright piece to each end of a board a little longer than the jar, and in each bore a hole large enough for the axle to turn easily. Support the jar between these uprights, and fix a crank-handle to one end of the axle, so that the jar may be revolved. If a piece of flannel be now pressed against the jar while it is turned, electricity will be developed. To collect the electricity, saw off a piece of broom handle a little shorter than the jar, round off the ends, and stick in it a straight row of pins, about a quarter of an inch apart. Cut off the heads with a stout pair of scissors and file the ends to a point. Then cover the whole piece of wood smoothly with tin-foil. Support this arrangement so that the points of all

the pins nearly touch the jar. The wood must be supported on glass, so that none of the electricity may escape to the ground. This may be done by boring a hole in the middle, and fitting into it the neck of a bottle, previously filled with sand or shot to make it stand steady. If, now, the flannel be pressed on the glass jar, on the side opposite the points, and the handle turned, the electricity will be gathered by the points and collected on the piece of wood covered with tin-foil, which is often called the "prime conductor." When the hand

is presented to the prime conductor, a spark will fly between them. To save the trouble of pressing the flannel against the glass by hand, a "rubber," made of leather stuffed with curled hair, may be fastened to an upright, so as to press continually against the jar. The rubber should be as long as the jar, and about an inch wide. To hold it against the glass, drive a nail under the jar and pass an elastic rubber band around this and the upright piece on which the cushion is supported. A piece of silk, oiled on the outside, is often

Simple Electric Machine.

fastened to the cushion and drawn over the top of the jar nearly as far as the collecting points. This prevents the electricity on the glass from escaping into the air before it reaches the collecting points. In case the cushion rubber is used, it should be smeared with an AMALGAM made by melting together equal parts of zinc and tin and then adding two parts of mercury. The mixture is powdered in a mortar before it is quite cold, and then made into a paste with lard.

The picture shows a simple machine made with a little more care,

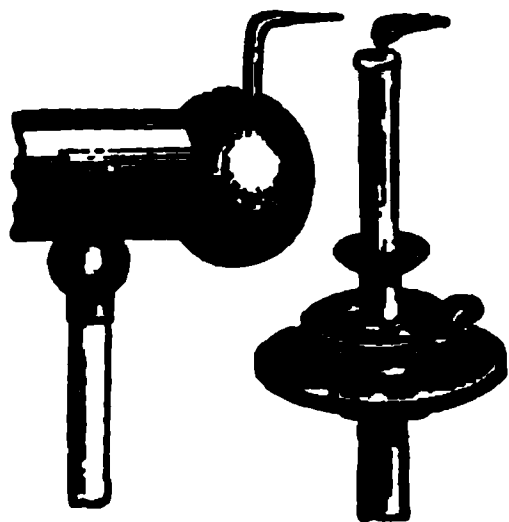
but easily put together with any one who can use tools. A is the base, B the supporter of the rubber, D the glass cylinder, E the axle, F the crank, G the prime conductor, and H its support.

The electricity collected by the points will be positive electricity. Negative electricity collects on the rubber, and may be gathered if the rubber has a wooden back coated with tin-foil. In this case the collecting points must be joined to the earth by a chain or wire. The whole machine must be kept very warm and dry or it will not work at

all. This is because moist air is a good conductor of electricity, which therefore escapes on all sides as soon as produced, instead of collecting on the prime conductor.

Experiments with the Electric Machine. 1. Make an insulating stool by placing a board on four inverted tumblers of thick glass. Let a person stand on this stool, and touch the prime conductor, while the machine is working. He thus becomes charged with electricity. If he is lightly charged, his hair will begin to stand on end. If another person, standing on the ground, now presents his hand to the charged person, a spark will pass between them. This experiment may be varied in many amusing ways; for instance, one may try to shake hands with the person on the stool, when a spark will pass between their fingers, or he may touch the tip of the other's nose or his ear.

Electric Breeze. 2. Fasten a pin, or other point, on one end of the prime conductor with a bit of wax, taking care that no wax gets between the pin and the conductor. When the machine is working, a little breeze will blow from the point of the pin. This may be felt by holding the face or hand in front of the point, or seen by holding a candle flame there (Fig. 1). The breeze is



Electric Breeze—Fig. 1.

caused by the repulsion of electrified particles of air from the point. It will be found impossible to draw a spark from the point, because its

electricity is thus carried away by the air so fast that enough does not collect to make a spark. This is the reason that it is necessary to have all parts of the prime conductor smooth and round except the collecting points. If there are any roughnesses on it, the electricity will pass off quietly from them and no spark can be obtained.

3. Stand a lighted candle on the prime conductor and point a pin at it; it will show that there is also a

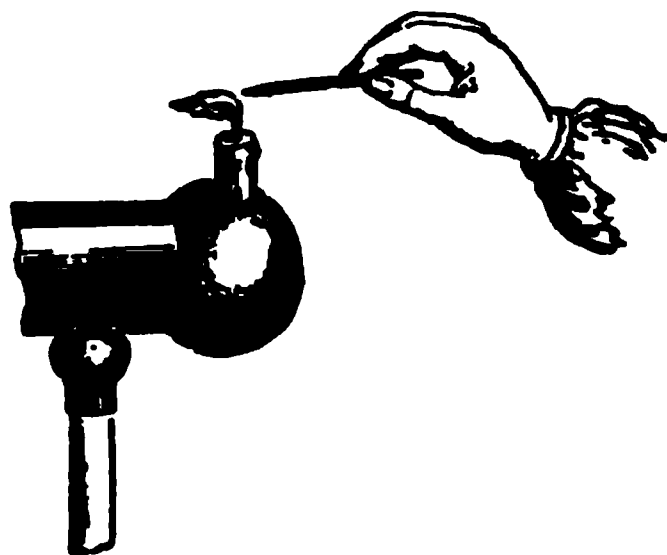


Fig. 2.

breeze from the pin when held in the hand (Fig. 2).

4. Let a small jet of water flow through a tube of brass or other metal. Connect the tube with the electric machine, and the water will spirt out in all directions, the electrified drops repelling one another.

5. Paste parallel strips of tin foil on a pane of glass, and connect them alternately on the two sides so as to make one continuous conductor, passing backward and forward, from side to side. With a sharp pointed knife or a knitting-needle draw a figure or design on the glass by scraping through the tinfoil. Connect the strip of tinfoil with the prime conductor at the top and the ground at the bottom, and work the machine. The electricity will pass along the strip, making a spark every time it has to jump one of the places where the foil was scraped away, and thus the design will appear in lines of light. An arrangement of this kind,

mounted on a stand, is shown in Fig. 3.

Fig. 3.

ELECTRICAL DECOMPOSITION, Experiments on. 1. Decomposition of Water. Connect the end wires of an electric battery, by means of platinum wire, to bits of platinum foil about an inch long by quarter of an inch wide. A hole should be punched in one end of the foil, the wire inserted, bent over, and hammered down so as to hold the foil tight. The wire is then bent so that it holds the foil up straight, and placed in a glass finger bowl or broad dish of some kind. The dish is filled with water mixed with a little sulphuric acid to help it conduct the electric current. The water must cover the foils and no kind of wire other than platinum must touch the water, lest the acid should act on it. Fill two test-tubes with the acidulated water, and invert them over the foils, the mouths beneath the water, taking care that no air enters. When one tube has been inverted, one person should hold it while the other is being prepared. The tubes may be held in place, if desired, by pinning strips of paper tightly around them

and hanging them by string to the edge of a shelf, or by a clamp stand, which can be bought of a chemical dealer. Such dealers generally have for sale the complete apparatus described above (see illustration), but it is quite easy to make it. When the electric current flows, bubbles of gas begin to rise from the platinum foil, which are caught in the test tubes. The amount of gas collected over the foil connected with the negative pole of the battery is about twice as great as that collected over the other. When sufficient has been obtained, place the thumb under each tube, lift it out and turn it mouth upward. The gas which collected fastest will burn with a blue flame when a lighted match is applied to it. It is **HYDROGEN**. The other will cause a spark on the end of a wood splinter to burst into flame. It is **OXYGEN**. The electric current broke up or decomposed the water into these two gases. If the bubbles do not rise at first it is probable that all the connections are not good, or else the battery is not strong enough. It is best to use several cells, connected tandem (see **ELECTRIC BATTERIES**).

Hydrochloric Acid. The appa-

Decomposition of Water.

tus described above cannot be used for this because **CHLORINE** is one of the gases produced, and it would eat away the platinum; so pieces of gas carbon are used instead. This can be obtained of dealers in electrical

supplies. A glass tube, bent into U shape, is filled with the acid, to which some common salt is added to prevent the chlorine from being dissolved as soon as it appears. A

Decomposition of Hydrochloric Acid.

piece of carbon is hung in each branch of the tube and each is connected with one pole of the battery. When the current passes, chlorine appears at the pole A and hydrogen at B.

Salts. Almost all salts (see C. C. T.) can be decomposed by electricity into an acid and a base. The salt used is dissolved in water and decomposed in a U tube, as described above. The production of an acid in one tube and an alkali or base in the other can be shown by means of TEST PAPERS. Salts which have a metal for one of their components deposit that metal on one of the poles. Experiments in the decomposition of such salts are described under ELECTRO-PLATING.

ELECTRICAL TOUCHSTONE, an electrical toy. Powder finely part of a stick of red sealing wax and some stick sulphur, and mix the two until the mixture has a yellowish pink color. Then tie up the powder in a muslin bag, so that when the bag is shaken a cloud of the sulphur and wax dust may be produced. Next, mark on a sheet of vulcanized rubber with bits of various metals. The marks will of course be invisible, but by dusting the sulphur and

wax over the rubber they at once become visible, the wax gathering along the lines made by the some of the metals, and the sulphur along those made by the others, so that some appear traced in red and the rest in yellow. The metals whose lines appear in red are zinc, iron, magnesium, and cadmium; those whose marks attract the yellow powder are tin, nickel, silver, antimony, bismuth, platinum, copper, and gold. The reason of all this is that when the powders are mixed the particles are electrified, the sulphur negatively and the wax positively. The part of the rubber over which the metal passes is also electrified, positively by some metals and negatively by others, and, as the rubber is a non-conductor, the electricity remains along the lines. When the powder is dusted on the plate, then the wax is attracted to the negative lines and the sulphur to the positive.

Other powders than those given above may be used; a mixture of red lead and sulphur being often employed. The experiment succeeds still better if the vulcanized rubber rests on a sheet of tin foil of the same size. Instead of using metals the lines may be traced with the knob of a charged LEYDEN JAR.

The name Electrical Touchstone was given the device by its inventor, Prof. Guthrie, from the stone called the touchstone, used by jewelers to test the purity of the precious metals.

ELECTROPHORUS, an arrangement for obtaining larger quantities of FRICTIONAL ELECTRICITY than can be got simply by rubbing. It consists of a plate of metal resting on some non-conductor. The simplest way to make one is to cut out a circular piece of tin and fit a non-conducting handle to it by melting the end of a roll of sealing wax and sticking it in the middle of the tin. Warm a pane of ordinary window glass and rub it briskly with silk, so as to electrify it. Then press the tin down on it, touch the finger to the

upper surface of the tin, remove the finger and lift the tin, as shown in the figures. On presenting the finger to the tin an electric spark can now be drawn from it. It is better to lay the glass on some metal surface, for instance, the top of a stove, or a

piece of looking-glass may be used, since that has metal on the under side.

A better electrophorus can be made as follows. Have a smooth piece of board, about a quarter of an inch thick, sawed into the shape of a



Simple Electrophorus.

circle, a foot in diameter, and then round off the sharp edges with a knife, finishing with sand-paper so that there shall be no rough places or angles about it. Bore a hole in the center, in which fit a glass rod or piece of tubing for a handle. Glue tin foil to this wooden disk, completely covering it, being careful to smooth it down so that there is not the least roughness. The lower part may be of glass, as before, of vulcanized sheet rubber, or of resin melted and molded in a flat cake. The mode of working is the same. The electrophorus can be used for charging a Leyden jar as well as an ELECTRIC MACHINE. The working of the apparatus is as follows. The electricity in the glass plate pulls apart the two kinds of electricity in the tin, attracting one to the under surface, and repelling the other to the upper surface. If the tin were now simply lifted off the plate the two kinds would unite again, but by touching the upper surface with the finger, before lifting, the kind on that surface is drawn off, leaving the tin charged with only one kind of electricity. If the finger remains on the tin after it is lifted, the electricity drawn off goes back again, and the tin shows no electrification. A sim-

ple electrophorus can also be made thus. Take a lacquered tea-tray about a foot long, and cut out a sheet of thick wrapping paper, large enough to cover the level part of the tray. Gum strips for handles at each end of the paper. Place the tea-tray on

Tea Tray Electrophorus.

two tumblers, and after heating the paper as hot as possible without charring it, lay it on a table and violently rub it with a dry clothes brush. Then place the paper on the tray, touch the tray, lift the paper, and on presenting the finger again to the

tray a spark may be drawn from it. This may be repeated several times without rubbing the paper again.

ELECTRO-PLATING. To plate with silver, dissolve equal quantities of nitrate of silver and cyanide of potassium in water, separately, and mix the two solutions. (Great care must be taken with the cyanide of potassium, as it is very poisonous.) The liquid will become turbid owing to the formation of a precipitate. Add more of the cyanide solution till this precipitate almost, but not quite, disappears. The solution now contains cyanide of silver. Place in the solution a piece of silver (such as a coin), and the article to be plated, connecting the coin with the positive pole of an **ELECTRIC BATTERY**, and the article with the negative pole. The article to be plated must first be thoroughly cleaned with ammonia, to remove grease. The electric current will decompose the cyanide of

be covered with copper by simply putting it in a solution of **BLUE VITRIOL**.

Gold-Plating. The process is the same as that just described, except that chloride of gold is used instead of nitrate of silver, and a gold coin is attached to the positive pole of the battery.

Nickel-Plating. The same process is used, except that the solution is formed of salts of nickel, dissolved in water. A piece of nickel may be suspended from the positive pole, but it is sufficient to add salts of nickel to the solution as fast as it becomes weakened.

The figure shows the arrangement of apparatus for any kind of plating, *a, a, a*, are bits of the metal used, *B, B, B*, the articles to be plated, *d* and *e* two metal rods, and *D* the battery.

ELECTROSCOPE, an instrument for showing whether or not a body is charged with electricity, and, if so, whether it is positive or negative. A simple one can be made as follows. Take a flask or bottle, clean and dry it, and insert in the cork a piece of glass tubing about an inch long. Cut a disk of tin or zinc, about an inch and a half in diameter, and drill two holes in it, one at the center and the other near the edge. Have one end of a brass or copper wire soldered in the central hole. Fill the glass tube with shellac, softened by warming, and before it is hard run the wire through it so that the disk is an inch or so above the tube. The lower end of the wire is cut off and bent at right angles so that it will be about in the middle of the bottle when the cork is in place. Now gum to the sides of the hook made by thus bending the wire, two leaves of "Dutch Metal" (which can be bought of a sign-painter), each half an inch broad and long enough to reach within an inch of the bottom of the bottle. The cork, with its wire, is now inserted in the bottle.

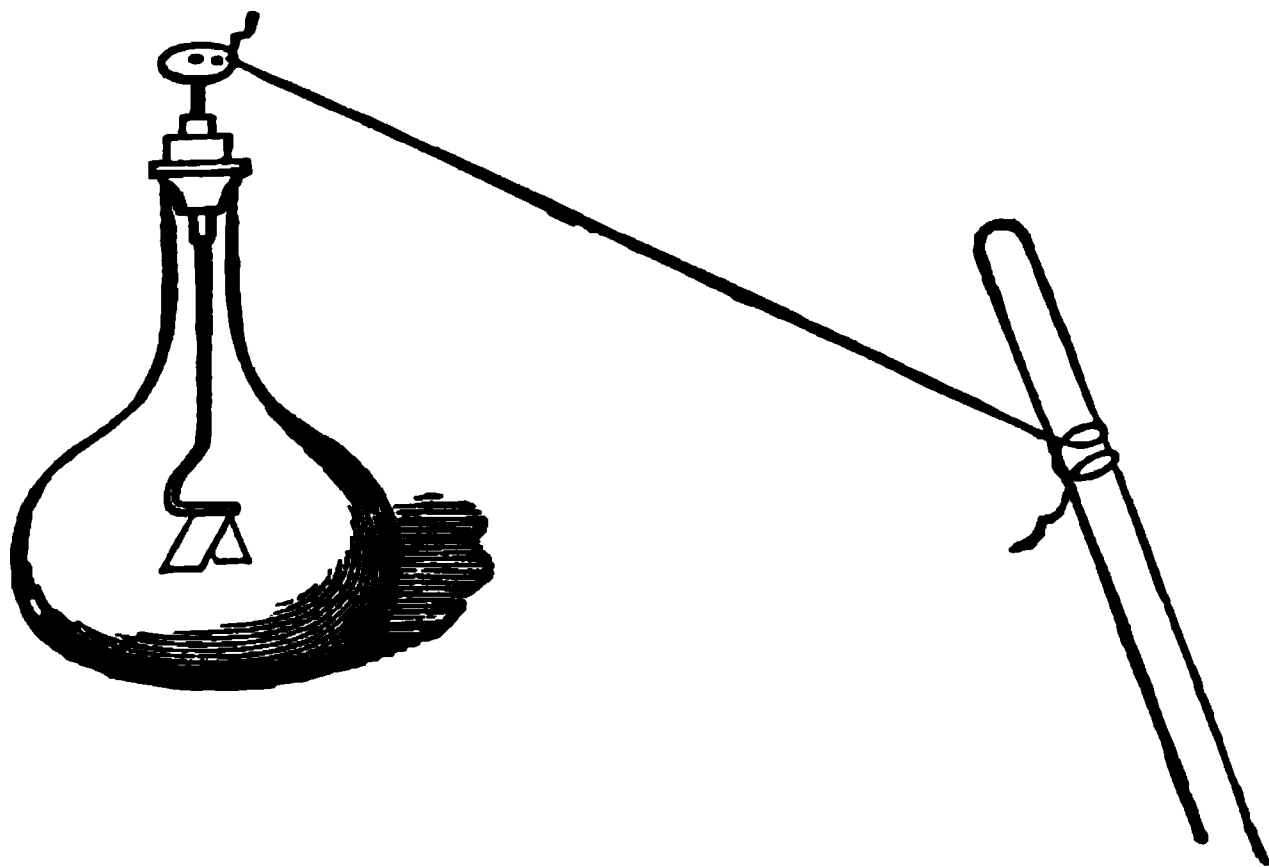
Electro-plating.

silver, depositing the silver on the article to be plated. The silver thus deposited has its place taken by part of the coin, which is slowly dissolved. The plating will be done faster the more powerful the battery. If several cells are used, they should be connected tandem (see **ELECTRIC BATTERIES**). When the coat of silver is as thick as desired, the article is removed and polished with whiting. The best metals to plate are brass or copper, or the alloys called German silver and Britannia metal, of which plated forks and spoons are commonly made. Most other metals have to be coated with copper before they can be silver plated. Iron can

To ascertain whether a body be electrified, bring it near the disk without touching. If it be electrified, the leaves of Dutch metal will fly apart, for the charged body draws near itself one kind of electricity and repels the other to the leaves. The leaves, being both thus charged with the same kind of electricity, repel each other. But this does not tell us what kind of electricity the body possesses. To find out this, the electroscope must be charged by touching the disk with a body whose kind of electricity is known. For instance, we know that wax rubbed with flannel is electrified

negatively. By touching the disk with a piece of wax so rubbed, we cause the leaves to diverge, and on removing the wax they should remain apart for some time, if the instrument has been well made. By now bringing the body to be tested near the disk, without touching it, the leaves will either collapse or fly farther apart. If the former, the body is positive; if the latter, negative.

Instead of this the electroscope may be charged by touching it with the body to be tested, and then a body whose electricity is known may be brought near it. If the body is



Electroscope.

large it may be connected with the electroscope by a wire, one end of which is fastened to the disk by hooking it in the hole in the edge.

The electrical pendulum, or suspended pith ball, may also be used as an electroscope, as described in the article on FRICTIONAL ELECTRICITY.

ELEPHANT, THE, a diversion in which two persons imitate an elephant. One stands behind the other, as in Fig. 1, both bending their bodies so that their backs are horizontal, and the rear one rests his

head and his hands on the one in front of him, as shown in the illustration. The first one holds a black cane with a curved handle to represent the elephant's trunk, and the second has in each hand a roll of white paper for tusks. The tusks must be long enough to project in front of the trunk. A gray shawl is now thrown over both boys, two pieces of gray cloth are pinned in the proper places for ears, and round bits of white paper, with black spots in the middle, are fastened on for eyes (see Fig. 2). As

Fig. 1.

Fig. 2.

the animal walks, the trunk should be swayed slowly to and fro. A showman, gaudily dressed in colored shawls, with a white turban, should accompany the elephant, and exhibit him to the company. It adds to the amusement if the showman pretends to speak in the Hindoo language, and what he says is explained to the audience by an interpreter. He can also lie down and let the elephant walk over him and perform other tricks usually shown in menageries.

Sports like this were common in England in old times, as is shown



Man Dressed as a Deer.

by the illustration, taken from an old manuscript. One man is seen dressed as a deer, while another beats a drum for him to dance.

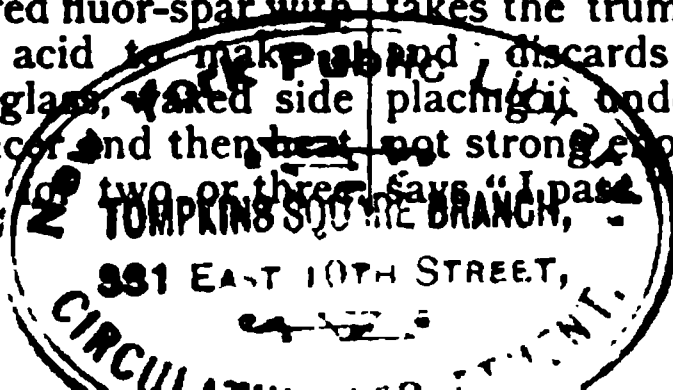
ELLS OF CLOTH, a children's game played by any number of boys or girls, two of whom represent a weaver and a merchant, while the others are called ells of cloth. The ells stand in a row, holding hands, and stretching apart as widely as possible. The cloth is then said to be unfolded. After making a bargain with the weaver, the merchant "measures" the cloth by taking hold of each ell by his hands. He then goes away, as if to get his money, whereupon each of the other players turns to one side, and clasps the one in front of him tightly around the waist, the weaver taking his place at the head of the line. On the merchant's return he is told that his cloth is folded and that he must unfold it. He then tries to make one of the players loosen his hold, by seizing the weaver's hands and pulling him about. As soon as any one lets go, he must stand on one side, and the game begins again. It may be continued till only one ell of cloth is left, or for any time the players choose. Sometimes those who let go are required to pay a forfeit.

ENGLISH AND AMERICANS.
See TUG OF WAR.

ETCHING. The preparation, by etching, of plates from which pictures are printed, is described in C.C.T., under ENGRAVING. Directions for etching an autograph or design deeply on brass or copper are given in this book in the article NITRIC ACID. To etch on glass, cover it with a thin layer of wax, as directed in that article, and scratch the design to be etched, as in the case of the metal. In an old saucer mix a teaspoonful of powdered fluor-spar with enough sulphuric acid to make a paste. Place the glass, waxed side down, over the saucer and then heat the mixture gently, for two or three

hours. The heat must not be great enough to melt the wax, and the saucer must be placed so that the fumes arising from the paste will not be breathed by any one, as they are poisonous. A good place is on the hearth of an open fireplace, or at the back of a range provided with a hood for the escape of the odors of cooking. When the glass is removed, the wax must be cleaned off with turpentine, and the design will be seen etched in the glass. The etching is done by the fumes of hydro-fluoric acid, which rise from the saucer and eat into the glass where it has been exposed by scraping away the wax.

EUCHRE (yoo'-ker), a game of CARDS, played by two, three, or four persons, with a pack from which all cards lower than the Seven are excluded. In the lay suits, the cards rank as in WHIST, but in the trump suit the Knave, which is called the Right Bower, is the highest card. The other Knave of the same color is called the Left Bower, and ranks next, both the Bowers being higher than the Ace. Thus, if Clubs are turned as trumps, the Knave of Clubs is the highest card, the Knave of Spades next, the Ace of Clubs next, and then the other clubs follow in the usual order. The Left Bower is also regarded as a trump in following suit. In the two-handed game, which will be described first, the dealer gives each player five cards, two and three at a time. He may give the two cards or the three cards first, but he must not give, for instance, two to his opponent and then three to himself. After dealing, he turns the top card of the stock face upward as trump. The non-dealer looks at his hand, and, if he thinks he can take three tricks, says "I order it up." The dealer then takes the trump into his own hand, discards his weakest card, placing it under the stock. If he is not strong enough to order it up, he says "I pass." The dealer may then



either take up the trump as if it had been ordered up, saying, "I take it up," or he may pass, turning the trump card face downward, and saying, "I turn it down." If the dealer pass, his opponent can now name any suit he chooses as trumps except the one turned down, saying, for instance, "I make it Spades," or, "I make it Hearts." If he does not choose to make the trump, he may pass again and the dealer is given a chance to do so. If the dealer does not make the trump there must be a new deal. As soon as the trump is ordered up or taken up, or a new trump is made, play begins. Suit must be followed, but when this cannot be done anything may be played. If the player that orders up, takes up, or makes a trump, win three tricks, he scores a point. If he fail to win three tricks he is euchred and his opponent scores two points. If either player take all five tricks, he is said to make a "march," and scores two points. Four tricks count no more than three tricks. Each player usually keeps score by means of two of the small cards that were thrown out of the pack, either a two and a three, or a three and a four, placing one on the other so as to show as many pips as he wishes.

Three-Handed Euchre. Each player in turn has the option of passing or ordering up, beginning at the dealer's left, and if each passes and the dealer turns it down, each has a chance to make the trump, as in two-handed euchre. If a player order up, take up, or make the trump, his two adversaries generally play together against him, and if they euchre him, each scores two points. Because two often play thus against one, the three-handed game is often called "cutthroat euchre." In the three-handed game a march usually counts three. The play varies according to the score. Thus, when A, B, and C are playing, if A takes up the trump, and C has already

three points, so that two more would put him out, it is for B's advantage to let A make a point rather than join with C to euchre him.

Four-Handed Euchre. This is always played in partnership, two against two. Each player has a chance to adopt or make the trump, as before, but the dealer's partner must say "I assist," instead of "I order it up," if he wishes his partner to take the trump card into his hand. If a player thinks, before playing has begun, that he has a strong enough hand to do without his partner's aid he says, "I play it alone," and his partner takes no further part in the hand. If he makes all five tricks alone, he scores four points; if he makes less than three tricks, he is euchred, and the adversary scores two points.

In playing the game the beginner should remember that to order up the trump requires a stronger hand than to take it up, since in the latter case the trump card is taken into his own hand; in the former, into that of an opponent.

In making a trump, other things being equal, make it the other suit of the same color as the one turned down (called "making it next in suit"), if opposed to the dealer, otherwise make it one of the other suits (called "crossing the suit"). The reason for this is that as the dealer and his partner both passed, it is likely that neither of them had one of the bowers, and the same cards will be bowers if the trump is made "next in suit."

The lead depends largely on what the actions of the other players show their hands to be. Thus, if the dealer has taken up the trump, the eldest hand should not lead trumps, but when (in playing the four handed game) the eldest hand's partner has ordered up or made the trump, the eldest hand should lead his best trump.

A skillful player will vary his play according to the state of the score.

Thus, if the dealer and his partner are four to their opponent's one (called a "bridge") the eldest hand often orders up upon a weak hand, thus preventing one of the other side from playing alone, gaining four points, and thus winning the game.

RULES OF THE GAME.

1. Players must cut for deal, and the lowest deals, the Ace ranking below the two.

2. If the dealer give any one too many or too few cards, there must be a fresh deal, unless the misdeal was caused by an interruption from his opponent.

3. If a card is exposed during the deal, there must be a new deal unless one of the players has looked at his hand, but the deal is not forfeited.

4. If a player deal out of turn, his deal is good if the mistake is not discovered before the first lead.

5. The dealer has not discarded till he has placed his rejected card under the stock. Before he has done so he may change his discard, but afterwards he may not touch it.

6. If a card be led by mistake before the discard, it cannot be taken back.

7. A player making the trump cannot change it after naming it.

8. A player may play alone only when he orders up, takes up, or makes a trump, or when his partner assists, orders up, or makes a trump.

9. He may not play alone after passing a trump or the making of a trump, nor when his opponents adopt or make the trump.

10. A player cannot announce, after the lead has been made, that he will play alone.

11. The partner of one who plays alone must place his cards face downward on the table and let them so remain during the hand.

12. After the trump card has been taken up, the dealer must tell its suit to any one who asks, but he need not tell what card it is.

13. Any card that is exposed, or played out of turn and taken back,

must be played whenever its holder is called upon to do so by his opponent, unless such a play would be a revoke. But if a trick has been completed from such a lead it must stand.

14. If a player revoke or refuse to play an exposed card on call, his opponents may score two points and the offender may score nothing that he has made in that hand; but if a revoke is discovered before the offender plays again, the only penalty shall be to treat the wrongly played card as exposed.

Railroad Euchre. A Joker is added to the pack, ranking always as the highest trump. If a player decides to play alone, he may call for his partner's best card, and discard one from his own hand. Either of the opponents is then allowed to play alone on the same conditions, and if a euchre is made under these circumstances, the score is four points. If the Joker is turned as trump, the next card also must be turned to decide the trump suit, but the Joker may be taken in hand, instead of the trump card, if the trump is taken up or ordered up.

Set-back Euchre. This may be played by two or more persons, each for himself. At the opening of the game each player's score is credited with five points. When he makes a point it is subtracted from the score, and when he is euchred he is set back two points, which are added to his score. He whose score is first reduced to nothing, wins.

Six-Handed Euchre. Three persons play in partnership against three others. The players sit so that no two partners shall be together. No trump is turned, but each of the players in order, beginning at the dealer's left, has the option of passing or bidding for the privilege of naming the trump, stating as his bid the number of tricks he thinks he and his partners can take, and the suit he wishes for trumps. Thus, he may say "I bid three on Spades," meaning that with

spades for trumps he undertakes to win three tricks. If a player cannot raise a previous bid he must pass. The suit of the highest bidder becomes the trump, and he also leads. If the players on his side win the number of tricks that he bid, they score that number of points; if they fail, the opposite side score the same number. No more than the bid can be scored, though more tricks be taken. The game is usually 25 points. Sometimes these are credited to each side at the outset and the score kept as in Set-back Euchre. Sometimes two sevens are thrown out of the pack before the game, so that all the cards are dealt, but often they are retained, and, after dealing, the two cards that are left (or three, if a Joker is used) are placed, face downward, on the table. These cards, called the Widow, are the property of the highest bidder, and he may exchange any or all of them for an equal number of his own cards. The method of scoring, and the use of the Widow and Joker must be settled by agreement at the beginning of the game.

Some players admit the playing of lone hands, in which case the score is counted as in Napoleon, ten points being won or lost. He who plays a lone hand must announce it before looking at the Widow.

Napoleon, a kind of Euchre played by from two to seven persons. The players bid for the privilege of making the trump, as in Six-handed Euchre, but no one tells what suit he bids on but the highest bidder, who announces the trump just before leading. Each one plays for himself. The score is usually kept with counters, which are divided equally among the players before the game begins. If the highest bidder win the number of tricks he bid to make, each of the others gives him that number of counters; if he fail, he gives that number to each of them. If he bid to take all five tricks, he must say "Napoleon," in which case

the number of counters won or lost is ten, or double the bid. If the highest bidder lead again after winning the number of tricks he bid to make, he must play all five tricks out, and if he do not take them all, he loses. The number won or lost in this case is but five, since he did not bid Napoleon. Instead of using counters, the score may be kept as in Six-handed Euchre.

When seven play this game, the four six spots must be added to the pack; when four or less play, the sevens, or the sevens and eights, may be rejected. When the game is played by four people in partnerships of two, it is called French Euchre. In this case the game is fifteen points, which are scored as in Six-handed Euchre.

Back-Handed Euchre. The players hold their cards with the faces toward the table, so that each sees all the hands but his own. Each one plays at random, and of course following suit is impossible. The game can be made very amusing, a player sometimes making a trump, when all but himself can see plainly that he has not a single card of that suit. But there is also more chance for skill than might be supposed, for by looking carefully at the other hands, a player may gain some idea of his own.

History. Some writers say that Euchre was first played by French settlers in Louisiana, and that both the game and its name are corruptions of the French ÉCARTÉ. Others think it was first played in Pennsylvania, and still others that it had its origin in Germany. It seems certain that the Bowers were so called from the word *Bauer* (peasant), a name sometimes applied in Germany to the Knaves. Wherever it originated it is now played more in the United States than in any other land.

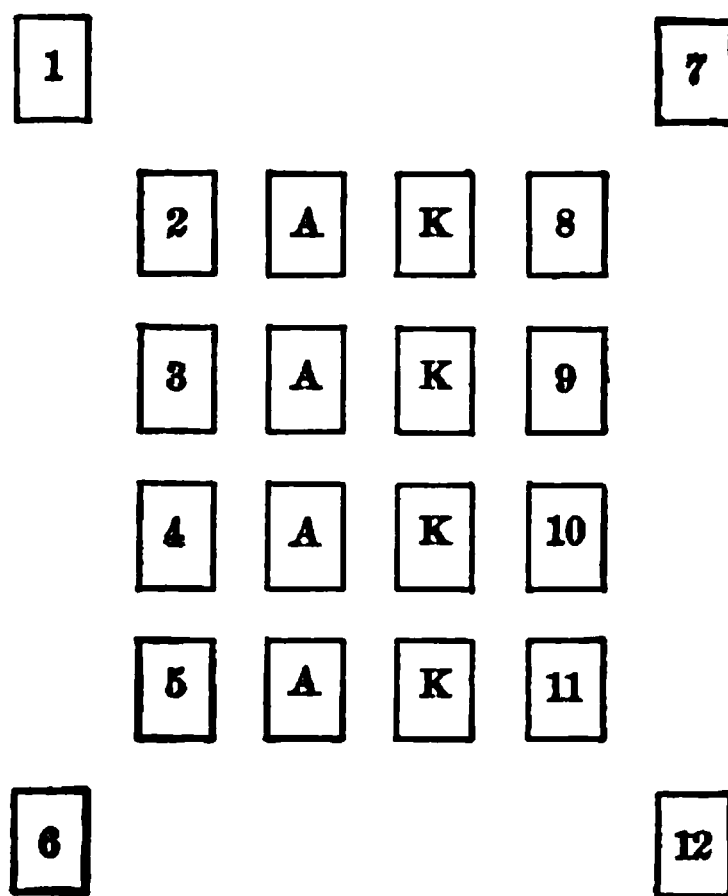
EVERLASTING, a game of cards played by any number of persons with one or more full packs. All

the cards are dealt one by one, and each player, without looking at those given him, places them, face downward, in a pile in front of him. The one at the left of the dealer then plays his cards, in the middle of the table, one by one, as they come, till he throws out a face card or an Ace. If it is an Ace, it is said to "call for" four cards from the next player; if a King, three; if a Queen, two; and if a Knave, one; that is, that player must begin to throw out the proper number of cards one by one, but if he throws out an Ace or face card before completing the number he must stop and let his left hand neighbor play to that card. If any one plays all the cards called for, without putting down a face card or Ace, all the cards on the table become the property of the player next before him. Thus, suppose A plays an Ace, which calls for four cards as explained above; if B plays those four cards without putting down an Ace or face card A takes the-trick, but if B's second card, for instance, is a Queen, he must stop and let C play to that Queen. The lower face cards take most tricks, since they call for fewer cards, and the chance of the next player's turning up a face card is therefore less. But as no one may look at his cards, but is obliged to play them as they come, skill does not enter into the game at all. When any player takes a trick, he places it face downwards, under his pile, and the game thus goes on till some one has taken all the cards, thus becoming the winner. This rarely happens in a short time, and it is best to agree beforehand on an hour when the game is to cease. The one that has the largest pile is then the winner.

RULES OF THE GAME.

1. No one may change the order of cards in his pile or in the middle of the table:
2. When all a player's cards are gone, he is out of the game.

EXCELSIOR, a SOLITAIRE game of CARDS, played with a full pack. The cards are dealt one by one, to form a figure like that below. They are placed on the numbered spaces, in order, except when an Ace or King appears. The Aces must be laid on one of the spaces marked A, beginning at the top, and Kings in like manner are put in the spaces marked K. When the last numbered space is filled, the player puts his next card on the first space again, and so goes on piling cards over and over again on the numbered spaces, till all the cards are dealt. The Aces and Kings, placed separately as



Excelsior.

explained above, are called Foundation cards, and the player's object is to build piles on them, by suits, in regular order, upward from the Aces, and downward from the Kings. In dealing, if any card fall on one of the four corner piles that can be used at once in building, it may be so used. But if such a card fall on one of the side piles, it can only be used when that side pile adjoins the Foundation card on which it belongs. In either case, when a card is so taken, another is at once dealt in its place.

After all the cards have been dealt, any top card can be used in building. The top card on any corner or side pile may be placed on any other of those piles whose top card is just above or just below it in rank, and of the same suit. The cards may be examined at any time. The cards in the side and corner piles may be twice redealt. If, after they have been played the third time, the piles on the Foundation cards can be completed, the player has won; otherwise, he has been defeated.

EYES, Experiments with the. The eyes are described in C.C.T.

1. Hold up the forefinger about a foot from the face, and look at an object beyond it, a tree for instance. The forefinger will appear double. Then look at the forefinger, and the tree will appear double. The reason is that when the two eyes are looking at the forefinger the right eye sees the tree on the right side of the finger, and the left eye sees it on the left side. When they are both looking straight at the tree, each sees the forefinger in a different place. If one eye be covered it is impossible to see either forefinger or tree double.

2. Place two bits of white paper on a table, about two feet apart. Cover the left eye, and with the right look steadily at the left piece of paper, at the same time walking slowly backward. A spot will be found where the right hand bit of paper will disappear. By looking with the left eye at the right hand bit, the left hand bit can be made to vanish in like manner. By moving the head ever so little forward or backward the bit of paper will be made to appear again. The nearer the pieces are together the nearer the eye has to be placed to them to make one disappear. If, instead of bits of paper on a table, pencil dots two inches apart on a sheet of paper be tried in the same way, one will vanish when the paper is held about six inches from the eye. In each case

the reason is that the retina of every person's eye has a blind spot in it, and when the image of the paper or pencil dot falls directly on that spot, it cannot be seen.

3. Hold the eye two or three inches from the perpendicular edge of some object seen against a bright background, part of a window sash, for instance, or, if it be night, a ruler leaning against the shade of a lighted lamp. Shut one eye, and holding the edge of a sheet of paper close to the other move the paper to and fro. The edge of the object will seem to move out to meet it. Repeat the same thing, standing about twenty feet away from the window sash or ruler, and the edge will appear to shrink away from the paper.

4. Let one person hold a candle, lamp, or some other bright object in front of another's eye. He will see in the eye three reflections. One is from the outside of the eyeball, another from one surface of the lens inside the eye, and the third from the other surface of the lens.

5. Cut out of black paper two exactly similar figures, crosses for instance, and place them side by side, almost touching, on a sheet of white paper. Hold them about three inches in front of the eyes, and three figures will be seen instead of two. The middle one consists of two, the image of the right hand figure, as seen by the right eye, being added to that of the left hand figure as seen by the left eye.

6. To see stereoscope pictures without a stereoscope. The stereoscope is described in C. C. T. Hold a stereoscope picture before the eyes and by fixing them as if to look at a distant object make the picture appear double, as in Experiment 1. With practice, the eyes can be so controlled that the two pictures nearest each other can be made to overlap and melt into one, in which objects will stand out just as when seen through the stereoscope.

7. Place a scrap of colored paper

or cloth on a gray ground, and look steadily at it for about a minute. Snatch the scrap away and in its place will be seen a spot of exactly the same shape but a different color. If the scrap is green, the spot will be red, which is the complementary or opposite color to green; if yellow the spot will be violet. If, instead of

will appear black shadows on a reddish ground, looking somewhat like leafless trees. These are the shadows of the blood-vessels on the retina.

10. Hold a pin so near the eye that it appears quite blurred. Look at it in the same position through a pinhole in a piece of paper, and it will be seen distinctly. In this way a pinhole in paper may be used to look at other small objects. It does not magnify them, but enables us to hold them much closer to the eye than we otherwise could.

11. Roll up a sheet of paper and look through it with one eye, keeping the other open. Hold up the left hand in front of the other eye, close to the farther end of the roll, and you will seem to be looking through a hole in your hand.

12. Divide a white pasteboard disk into an even number of sections and blacken every other one, as shown in Fig. 2. Spin the disk rapidly by means of a TWIRLER and by looking at it steadily it will appear tinted, the color changing with the speed of rotation. The disk generally appears greenish first, and then pinkish.

Fig. 2.
Experiment 12.

Another way of performing the experiment is to cut away sectors from a black disk and then rotate it between the eye and a cloudy sky. The sky will gradually assume different tints which vary with the speed of the disk. None of these colors are real, but caused by the excitement of the optic nerve by a rapid succession of darkness and light.

13. Cut in a piece of cardboard two square holes, each about half an inch square and a quarter of an inch apart. Procure a number of bits of glass of various colors, about an inch square, and fasten two behind the holes in the cardboard by means of

Fig. 1.—Experiment 7.

pulling the paper away, the eye be directed to the ceiling, the spot will be seen there. These spots, which are often called "ghosts," are caused by the action of light on the retina. The accompanying figure (Fig. 1) is a good one to experiment on. Look at it steadily for some time and then look at the ceiling, where it will shortly appear in black on a white ground.

8. Light a splinter of wood, and whirl it about in a dark room. It will seem like a circle of fire. This is because the image of the lighted end remains in the eye while it is being twirled around. For other experiments, showing that images remain in the eye for a fraction of a second, see THAUMATROPE, ZOETROPE, and Chameleon TOP.

9. In a room in which there is no other light, hold a candle before one eye, closing the other. The candle must be moved up and down a little on one side of the eye and two or three inches from it. Presently there

elastic bands. Buy of an optician what is called a double-refracting prism, a piece of Iceland-spar or calc-spar which makes objects seen through it appear double. Hold the card up to a window or lamp and look through a prism at it. Each colored hole will appear double, and by holding the prism at the proper distance, one color can be made to overlap the other, so that the eye sees a mixture of the two. Note what this is. Now unfasten the bits of glass and look through both together at the light. The mixed color is entirely different from that obtained before. The reason is that in the first case one color really added its effect to the other, whereas in the second case the color seen is merely that remaining after each glass has strained certain colors out of the sunlight. Thus, suppose blue and yellow glass be tried. A mixture of pure blue and yellow light makes white, so the color seen through the prism will be whitish gray. But, when looked through together the glasses will appear green, because the rays of light are the only ones which will pass through both yellow and blue glass. In the same way red and green appear orange by the first method and dark green by the second; red and blue seem first violet and then deep red; and yellow and red appear first orange-yellow, then orange-red.

14. Darken the room and admit a little daylight (not direct sunlight) through an opening. With this throw the shadow of a rod or other object on a white wall or screen, and light a candle, so as to throw a second shadow. Alter the size of the opening through which daylight is admitted, so as to make the two shadows as nearly as possible of the same intensity. The shadow thrown by the candle is really white, since it is the only part of the wall on which pure daylight shines alone, yet by contrast it appears blue. If it be looked at through a roll of black cardboard or paper the part of the

wall about it will continue to appear blue, even when the candle is put out, but on removing the roll from the eye, it seems white again, and cannot be made to look blue except by lighting the candle a second time.

15. With a pair of compasses draw six or eight concentric circles, as near one another as possible. Make four dots, dividing the outermost circle into equal parts, and then join these dots by straight lines, drawn with the aid of a ruler. (Fig. 3.) These lines will appear to be curved inward. This is because they cross the circles at different angles.

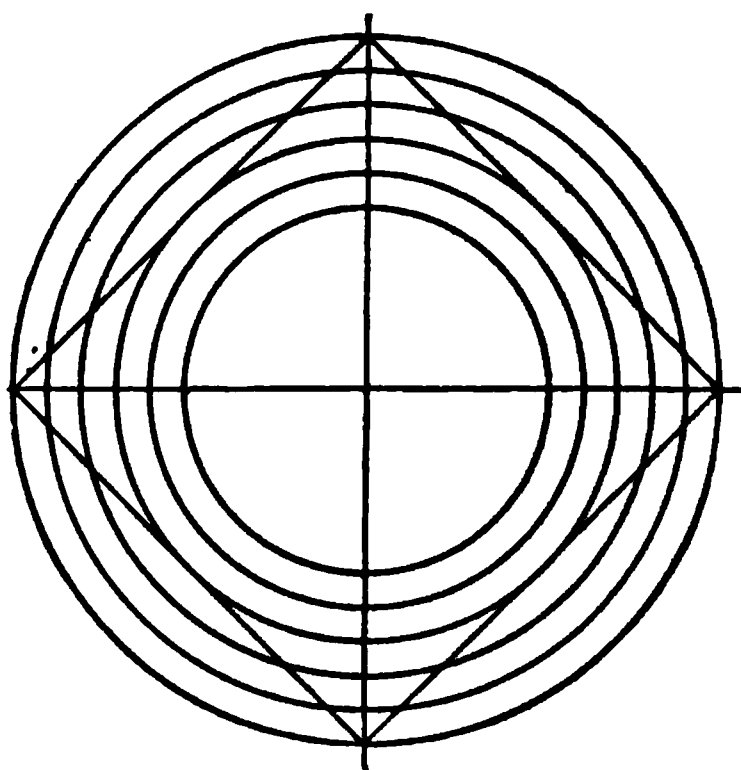


Fig. 3.—Experiment 15.

and the judgment of the observer cannot help attributing this, in part, to the curvature of the line.

16. Hold horizontally, a little below the eyes, a rod about a foot long, with its near end six or eight inches from the face and its opposite end pointing directly away. Look at the near end, and the two images of the rod will appear like a V, with the point toward the face. Fix the eyes on the farther end, and the V will have its point away from the face.

17. Press the closed eye with the finger tip close to the nose. A dark spot with a light border will be seen on the other side of the eye. If the eyeball be pressed on the outside the spot will be seen on the inside.

18. Rub or press the closed eyes for some time, and designs and spots of various shapes and colors will be seen changing of themselves or according to the varying pressure. These spots are all caused by the excitement of the optic nerve by pressure.

19. Draw a number of lines converging to a point toward either the right or the left, and then draw several upright lines of the same length across these as in Fig. 4. If any one

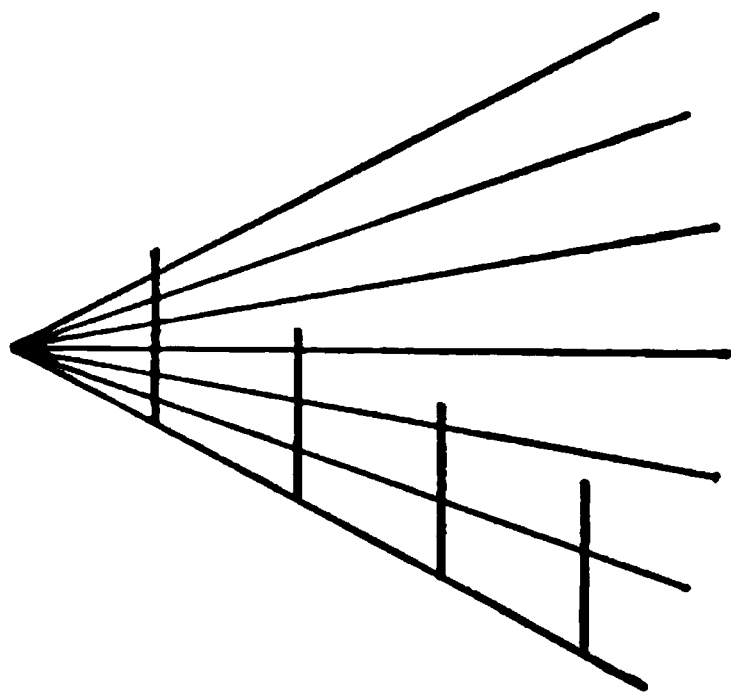


Fig. 4.—Experiment 19.

who does not know, be asked which is the largest of the upright lines, he will be apt to point out the one crossed by the greatest number of the converging lines.

20. After reading for some time with one side toward a window, close the eyes alternately, and it will be seen that the paper of the book has a greenish tinge when seen by that eye alone which was next to the window. This effect is stronger if the light be very bright.

The reason is that the light, shining through the blood-vessels in the eyelid, tries that part of the eye that appreciates red, and so a white page appears to it slightly tinted with the complementary or opposite color, green.

21. Observe the letter S in a book, for instance the one just given. The bottom and top seem to be of about the same size. Turn the book up-

side down and look at the same letter. What is now the bottom appears much the smaller part. The reason is that the eye tends to magnify the upper part of a figure. For this reason the lower half of the S's are usually made a little larger than the upper, to balance this tendency, but when the letter is inverted the larger half is now at the top and so looks larger still.

22. Cut out two pieces of paper of exactly the same size, shaped as in

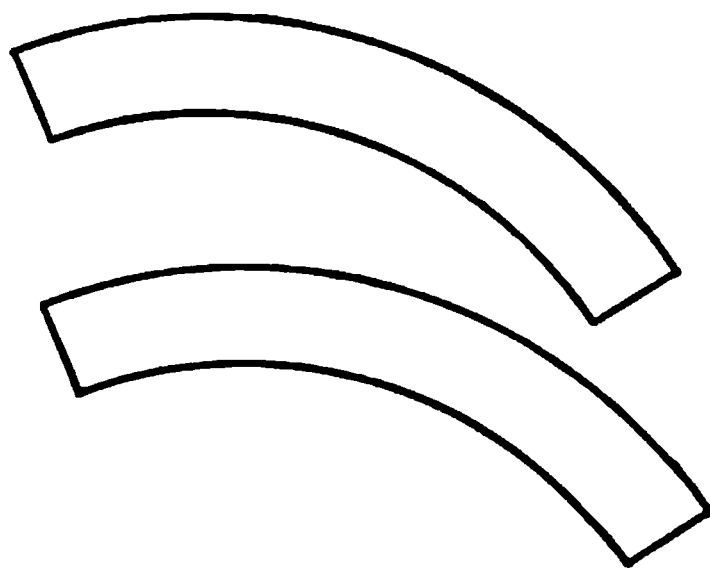


Fig. 5.—Experiment 22.

Fig. 5, and place them as there shown. The eye will usually judge, at first sight, that the lower is the longer. If the pieces be made of different colors, to distinguish them, and their places be changed, one will seem to have decreased and the other to have increased.

23. Make a pinhole in a card and hold it three or four inches before the eye. Hold a pin-head as close to the eye as possible and it will be seen, upside down, in the pinhole. This is because, though the pin is much too near the eye to form an image on the retina, the ray of light through the pinhole causes it to cast a shadow there. This shadow is upright, whereas the images of objects are inverted, so, as they appear right side up, the shadow appears upside down. If several pinholes be made instead of one, the pin-head will be seen in each one of them, because each ray of light throws a separate shadow of the pin-head on

a different part of the retina. Any object of similar size may be used instead of the pin, and if it be moved in any direction the shadow will be seen to move in the contrary direction. If the eyelashes be allowed to fall over the eye, their shadows will be seen to move upward in the pinholes.

24. Look at Fig. 6. The horizontal lines appear to be nearer together at the middle than at the ends, but this is not so. They are quite straight and parallel.

The appearance is due entirely to the diagonal lines above and below them.

25. Look at anything having a regular pattern, such as a piece of figured cloth or calico, or better still a piece of wire netting or the seat of a cane-bottomed chair. By relaxing the eyes so that they will be fixed on a point beyond the object, the two images of the figured surface may be made to appear to slide one over the other, and by practice may be

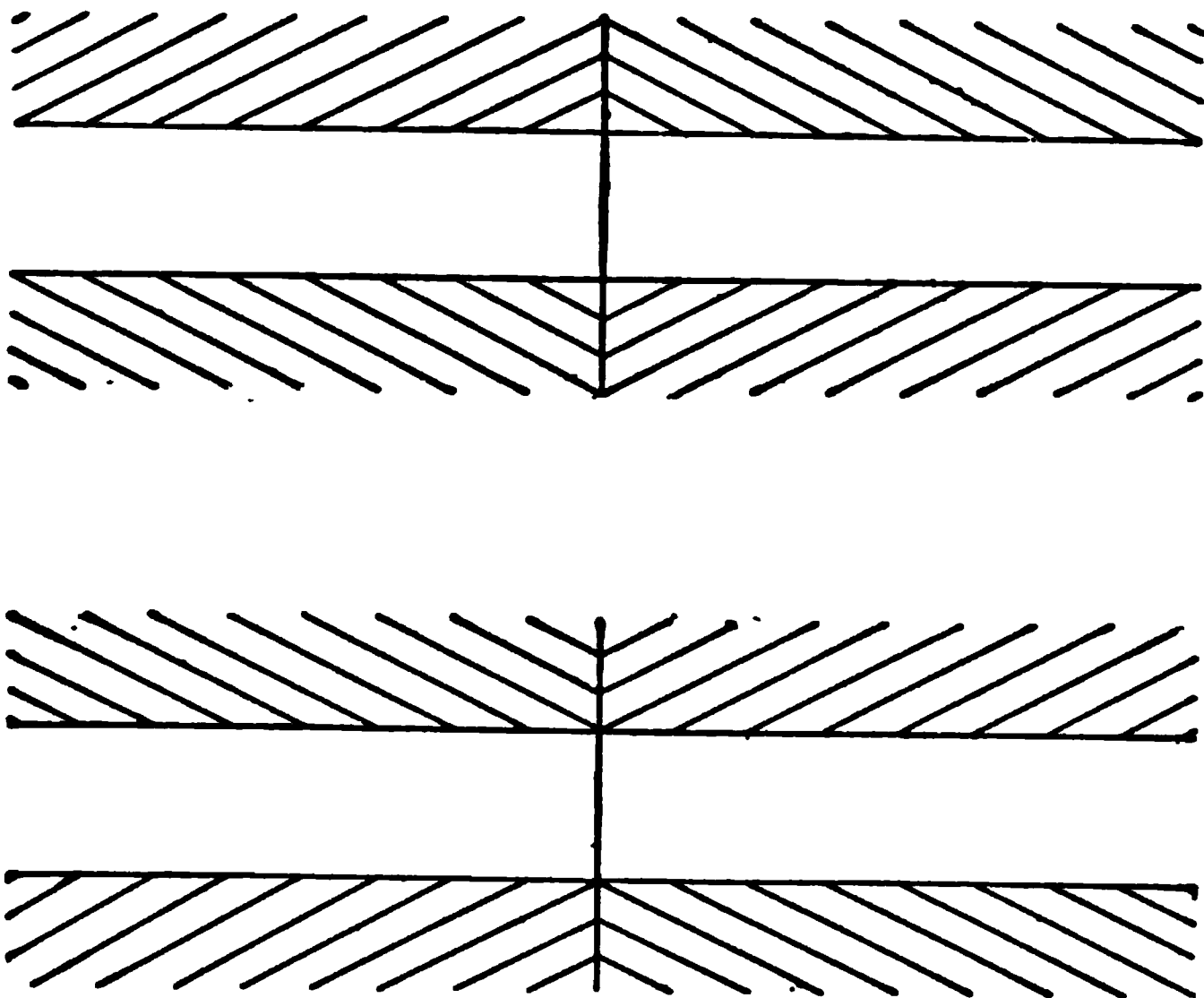


Fig. 6.—Experiment 24.

made to stop where the observer pleases. If he thus causes the image of each figure to coincide with the one next to it, the surface will seem farther from his eye and the figures larger. If he causes the images to overlap still more, so that each falls on the second one from it, the effect will be increased, and so on. If he fixes his eye on a point nearer him than the surface, the latter will appear nearer, and the

figures smaller. If the observer cannot direct his eyes to one point while noticing another he should hold his finger either in front of the surface or behind it, and look directly at it, trying at the same time to watch the figures on the surface.

This experiment requires considerable practice, and some people find it more difficult than others. When properly done the effect is striking.

26. Darken the room and cover one window with cloth or paper having the figure of a cross cut through it. Look steadfastly at this for a few seconds and then look at the wall of the room. The "after image" of the cross will be seen. If the eye be now directed, without moving the head, to one of the corners of the room the arms of the cross will appear twisted so that the cross will look thus \times or thus \times .

This is because the eyeball is twisted a little in turning it toward the corner of the room, so that

the image on the retina is distorted.

27. View a straight line, a , through



Fig. 7.—Experiment 27.

a pinhole, o , in a card, as shown in Fig. 7. It will appear to broaden as it nears the eye.

F

FABA-BAQA. See **BRAN BAGS.**
FAQQOTS. See **FOX AND**
GEESE, II.

FAMOUS NUMBERS, a game played by any number of persons, each of whom writes a number on a slip of paper. The slips are mixed in a hat, and each player draws one. Each in order must then explain for what the number he drew is famous, or pay a forfeit. For instance, the number three may be said to be celebrated on account of the Three Graces. Two for Shakespeare's "Two Gentlemen of Verona." Ten for the Council of Ten, and so on.

FANORONA, a game played by two persons, with 22 white and 22 black pieces or men, arranged on a

board like that shown in the diagram. The players sit opposite each other, and take turns in moving. A piece may be moved to any adjacent unoccupied angle, forward, backward, diagonally, or to either side. If, when any move is made, a piece is face to face with one of the enemy's, no vacant space being between, all of the enemy's pieces extending in unbroken line in the direction of attack are captured and removed from the board. If the line is interrupted by a vacant space, or hostile piece, the men are captured only as far as such space or piece. He who succeeds first in capturing all his opponents' pieces wins the game.

RULES OF THE GAME.

1. The first player is allowed only **ONE MOVE.**

2. After the opening of the game, each player is allowed to move, using any piece he pleases, so long as he continues to capture. When he ceases to capture, his opponent begins his turn.

3. A player must not return at once to a point he has just left.

4. A player must not capture in any direction immediately after making a capture in the opposite direction.

Fanorona is the national game of the natives of Madagascar, who have reduced it to a science. In Madagascar a defeated player is not al-

Fanorona Board.

board like that shown in the diagram. The players sit opposite each other, and take turns in moving. A piece

lowed to play his second game on the same footing as the first, but must play a new form of it, called Vela. In this form the defeated player plays first, and the other exposes to capture such pieces as he chooses, till seventeen have been taken, but these can be taken only one at a time. Until the entire number are captured, the owner of them can make no captures. The game then goes on as in the ordinary way. A defeated player is allowed to play only the Vela game, till he has won a victory.

FARM YARD, THE, a trick in the form of a game. One of the company, chosen as leader, tells the others that they must sit in a circle, and each personates some animal. He says that he will first whisper in the ear of each what noise he is to make, and that all must rise and make their noises at a given signal. He then whispers to each, directing them all to remain quiet, except one, whom he tells to bray like a donkey. When the signal is given, the victim of the trick rises and brays, while the others sit still.

FARRAGO. See SYNTHESIS.

FAST RUNNERS, a running game played by any odd number of persons. All but one are arranged in a column by pairs, all facing toward the same end of the column. The remaining player stands alone at the head of the column, and at a signal from him the two at the foot divide and run on the outside of the lines past the head, after which they take different directions. If the one at the head can catch either before they meet again and join hands, that one must take his place, and he becomes the partner of the other, standing close to the head of the line. If the couple join hands before either is caught, they stand close to the head, and the unsuccessful runner is at the head again. At the signal the couple now left at the foot begin to run in like manner, and so on till the players are tired. Neither of the runners

can be touched until he has passed the head of the column.

In Germany this game is called *Fang Schon* (Begin now), and in Russia "It Burns," from the cries of the runners. In Belgium it is called "Bride and Bridegroom," and in Suabia *Brautlauf* (The Bride Chase). These last names seem to show that it is derived from the old custom of requiring the bridegroom to carry off the bride by force, or pretend to do so.

FEELING, Experiments on. 1. Cross the forefinger and middle finger of one hand, and with the tips feel a marble or small pebble held in the palm of the other. It will feel as if there were two marbles. The reason is that the marble is felt at the same time by the two sides of the fingers which are usually farthest from each other, and the mind cannot help concluding that there are two marbles. The best way of performing the experiment is to let some one else cross his fingers, shut his eyes, and guess how many marbles he feels. If more than one held in the hand, guessing becomes still more difficult.

2. Prick a person's hand with two pins held very close together. It will be found that he cannot tell when you use two points and when only one, provided the points touch him exactly at the same time. On some parts of the body the pins may be held about half an inch apart before the two separate pricks can be felt. The reason is that the nerves of the skin form a network which is much closer in some places than in others. Where the meshes are very large the nerves cannot distinguish two sensations which are very near together. If blunter points be used than those of pins, the effect is more striking.

3. Take a long hair, and with the thumb and forefinger of one hand pull it through those of the other, first in one direction and then in the other. It will be found that it slips easily one way and will scarcely slip

at all in the other. The reason is that each hair is covered with a kind of scales which grow in one direction, and it is therefore easier to rub the hand over it one way than the other, though the scales cannot be seen with the naked eye. The direction in which it is easiest to stroke hair is always down, or from the root, hence it is always possible to tell by feeling which end of a hair grew nearest the root.

4. Fill one glass with water almost as warm as the hand can bear, another with cold water, and a third with lukewarm water. Hold one hand in the warm water and the other in the cold water for about 15 or 20 seconds, and then put them into the lukewarm water. It will feel warm to the hand which has been in the cold water, and cold to the other. The reason is that we cannot really tell the temperature of objects by the touch, but only whether they are warmer or colder than ourselves.

5. Put a piece of iron and a piece of wood into the ice box of a refrigerator, and let them remain several hours, long enough for both to get ice cold. Then take them in the hand, and the iron will feel colder than the wood. Put them in a moderately warm oven for half an hour, and feel them again. This time the iron will be the warmer. The iron may be even too hot to hold, while the wood can be taken up easily. The reason is that iron is a better conductor of heat than wood. Heat therefore goes from the iron to the hand, when it is hot, faster than it does from the wood, and iron takes heat away from the hand faster when it is cold.

FEMME SOLE, a game of CARDS, played by three persons with a full pack. The deal is determined by cutting, the lowest card indicating the dealer. He separates a EUCHRE pack from the full pack, and deals eleven cards, one by one, to each of the other players and ten to himself.

He then takes the remaining cards of the full pack, called the Stock, shuffles them, and gives them to the player on his right to cut. The card cut determines the trump suit, and the dealer then takes the Deuce of that suit from the stock, to complete his own hand. There is thus in play, besides the regular Euchre pack, one Deuce, which, as the trump changes, is sometimes of the trump suit and sometimes not. It always ranks as the highest card in the pack, except when played in its own suit, where it is lowest, as in Whist. The highest trump is the Queen, called *Femme Sole* (a French term used in law to mean an unmarried woman). The eldest hand now leads any card except the Deuce. Suit must be followed, if possible (except that the Deuce may be played out of suit), and the trick must be taken, if possible. The winner scores one for the trick, which he takes into his own hand, making the hands equal again by giving to each of the other players one of his cards, according to the following plan :

1. If one of the others holds *Femme Sole*, and the other the Deuce, he gives to the holder of each card a card in its suit.

2. If the two should be in the same hand he gives a card in the Deuce suit to that hand, and placing the Deuce in the stock, substitutes for it any other Deuce he pleases, telling what it is, as he does so. This is called "clearing the Deuce." To the third player he gives any card he chooses.

3. If the Deuce and *Femme*, or either of them, are in his own hand, he gives a trump to the player with the highest trump, and any card to the other player.

4. Should he not be able to do as he should, he may give out any card he pleases, but then is not allowed to score for the trick.

The winner shuffles and cuts the stock for a new trump after each trick, but there is no fresh deal till

the close of the game, which is won by the first player who makes eleven points.

The general rules for playing are as in WHIST. It is best to lead from a long suit, and in giving out after each trick, low cards should be chosen. Deuce is least valuable when it is unsupported by other cards of the same suit, for then, by leading that suit, an opponent may force the holder to play it, when it will be taken, being low in its own suit. When a player gets the privilege of "clearing the Deuce," therefore, he should select, as the new Deuce, one of whose suit the holder of the Deuce has very few.

FENCING, exercising with foils. Fencing foils are tipped with metal or gutta percha buttons, so that no injury can result from a touch, but both contestants usually wear leather jackets to protect them in case a button should break off, and each

resting under the wrist. The foil should be held lightly, but so that the fingers will take an instantaneous grip, (see Fig. 2.) The various movements in fencing, which are chiefly called by French names, will now be described. By carefully learning their names, and practicing them,



Fig. 2.—Holding Foil.

beginners will soon be ready to apply them and vary them in actual contests, when parrying or thrusting. The principal kinds are the Engage, the Guard, the Thrust, and the Parade. The Engage is a position where the adversaries' foils touch each other; the Guard is a position of the foil intended to protect its holder; the Thrust is a forward motion of the foil toward the opponent in an endeavor to touch him; and the Parade is a movement of the foil to parry, or turn aside, a thrust. Any of these positions or movements may be in Prime, Seconde, Tierce, Carte (or Quart), Quinte, Sixte, Half Circle or Octave (words derived from the French numerals from 1 to 8), according to the way in which the foil is pointed and held, as will now be explained. What are called the lines of defense are illustrated by Fig. 3, which is supposed to show the body of the fencer's opponent divided into quarters by two lines, a horizontal and a vertical. The space on the right is called the outside, and that on the left the inside, and the quarters, called the "lines of defense," are thus the Inside high, Outside high, Inside low, and Outside low. Each of these quarters may be defended by two different positions of the foil. In each the sword-hand is supposed to be opposite the center and the foil extending into the quarter to be defended.

Before engaging in a regular con-

Fig. 1.—Fencing Mask.

has over his face a mask of wire gauze (see Fig. 1) and a padded glove on his right hand.

The foil should be held with the hilt (or handle) flat in the hand, the thumb being stretched along the upper side, and the pommel, or end,

test, the fencers must practice some of the most common positions and movements. Each fencer first assumes what is called the first position, by placing the right heel in the hollow of the left foot, and holding the foil just below the hilt, between the thumb and fingers of the left hand, so that it hangs at the left side (Fig. 4). The right arm hangs down easily and the right side is turned toward the opponent. The fencer then takes "second position" (Fig.

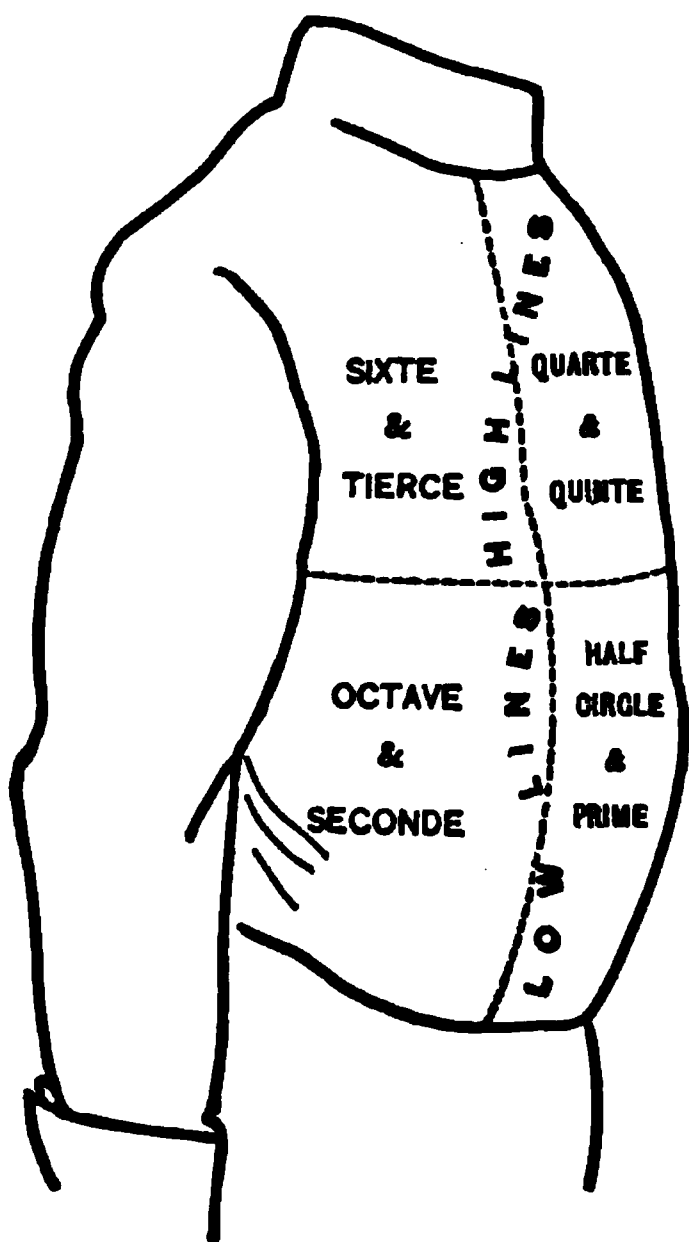


Fig. 3.—Lines of Defense.

5), by bending his right arm across his body, and taking the foil by the hilt, and "third position" (Fig. 6), by raising both hands above the head, sliding the foil through the left thumb and fingers till they hold it near the button. Both knees are now slightly bent till they are directly above the toes, and the fencer steps out about two feet with his right foot, the knees being kept bent. The

foil is now released with the left hand and brought down so that the point appears to cover the opponent's left eye. The right arm, which holds the foil, is bent, the elbow drawn in, and the hand on a level with the chest. To balance the right arm and foil, the left arm is still held up in a curve, the palm toward the right, and about as high as the top of the head. The body is upright and supported on both legs. The fencer is now "on guard in carte" (see Fig. 7).

The guard "in tierce" differs from this only in reversing the hand, so that the nails are half-turned downward, and in stretching the arm a little outward, to cover the outside of the body. When two fencers engage in carte (see Fig. 8), each has his foil on the right of his adversary's, that is on his adversary's inside, so the guard of carte is called an "inside guard." In the engage of tierce the foils touch on the other side, it being an "outside guard." When a fencer shifts his foil from carte to tierce, or *vice versa*, he is said to "disengage." This is done in carte or tierce by lowering the foil just enough to clear the adversary's, and raising it on the other side. In engaging, the foils are crossed at a point about nine inches from the point. The most common guards, besides those already described, are those of half-circle and octave. The half-circle guard is an inside low guard, usually to protect against a thrust in second or low carte (see below). To take it, the hand is raised to the left shoulder, the elbow turned in, and the point of the foil is held on a level with the adversary's waist. The octave is a low outside guard, generally used against the thrust of octave (see Fig. 9). The hand is raised to the chest, with the point of the foil on a level with the lower part of the adversary's chest. In disengaging from the guards of half-circle and octave, the foil is slipped *over* that

of the opponent, not *under*, as in tierce.

Thrusts. The usual thrusts are

made by means of the half longe (or lunge) and the longe. To make the half-longe, the fencer stands on

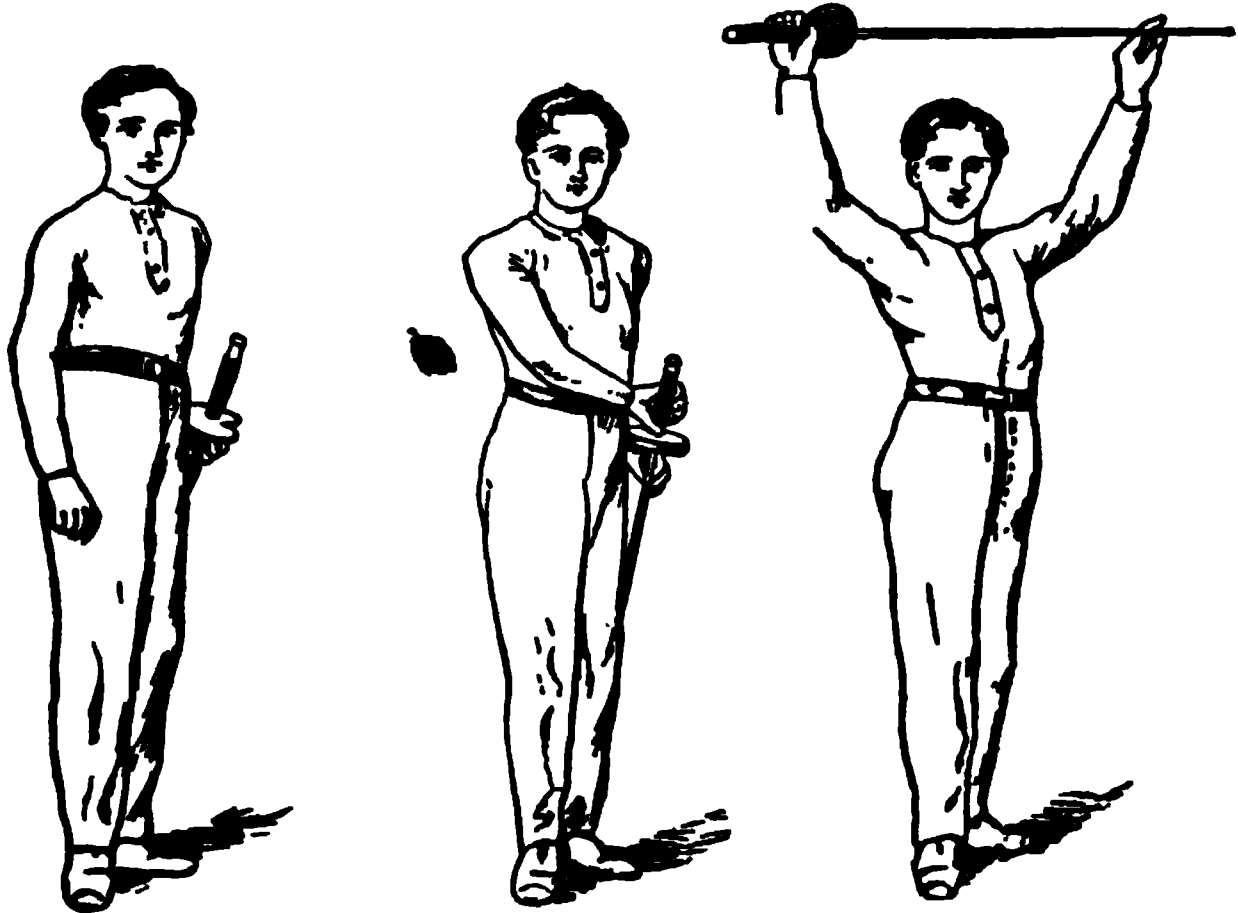


Fig. 4.—First Position. Fig. 5.—Second Position. Fig. 6.—Third Position.

guard and first straightens the right arm, bringing the hand up as high as his face, and additional impetus is gained by throwing the left hand down, palm outward, so that the arm is parallel with the leg; simultane-

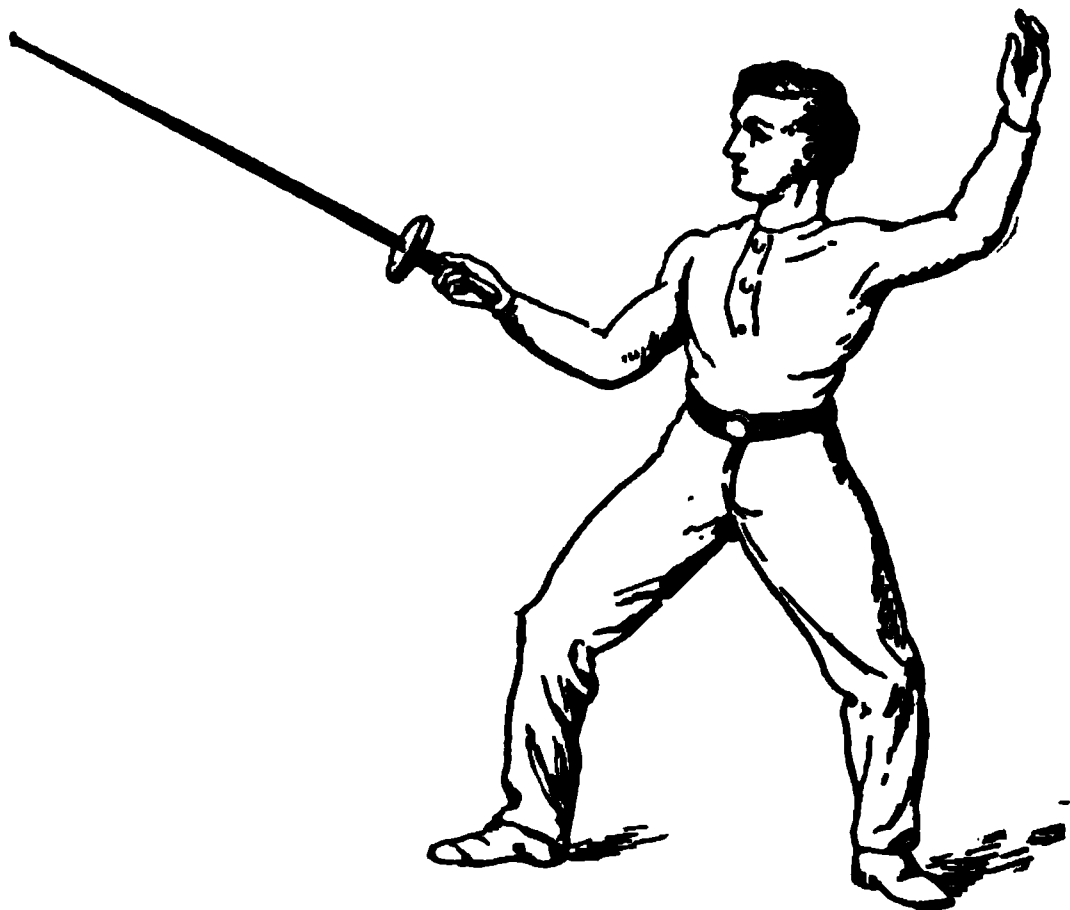


Fig. 7.—On Guard in Carte.

ously, the left knee is straightened and the weight of the body thrown on the right leg, without moving either foot from the ground. The full longe is made in like manner, but by also stepping forward with

the right foot as the weight is thrown on it (see Fig. 10). Reversing these movements so as to bring the fencer on guard again, is called "recovering."

When the fencer, being on guard, wishes to advance, he moves the right foot forward about a foot, and instantly, almost at the same time, fol-

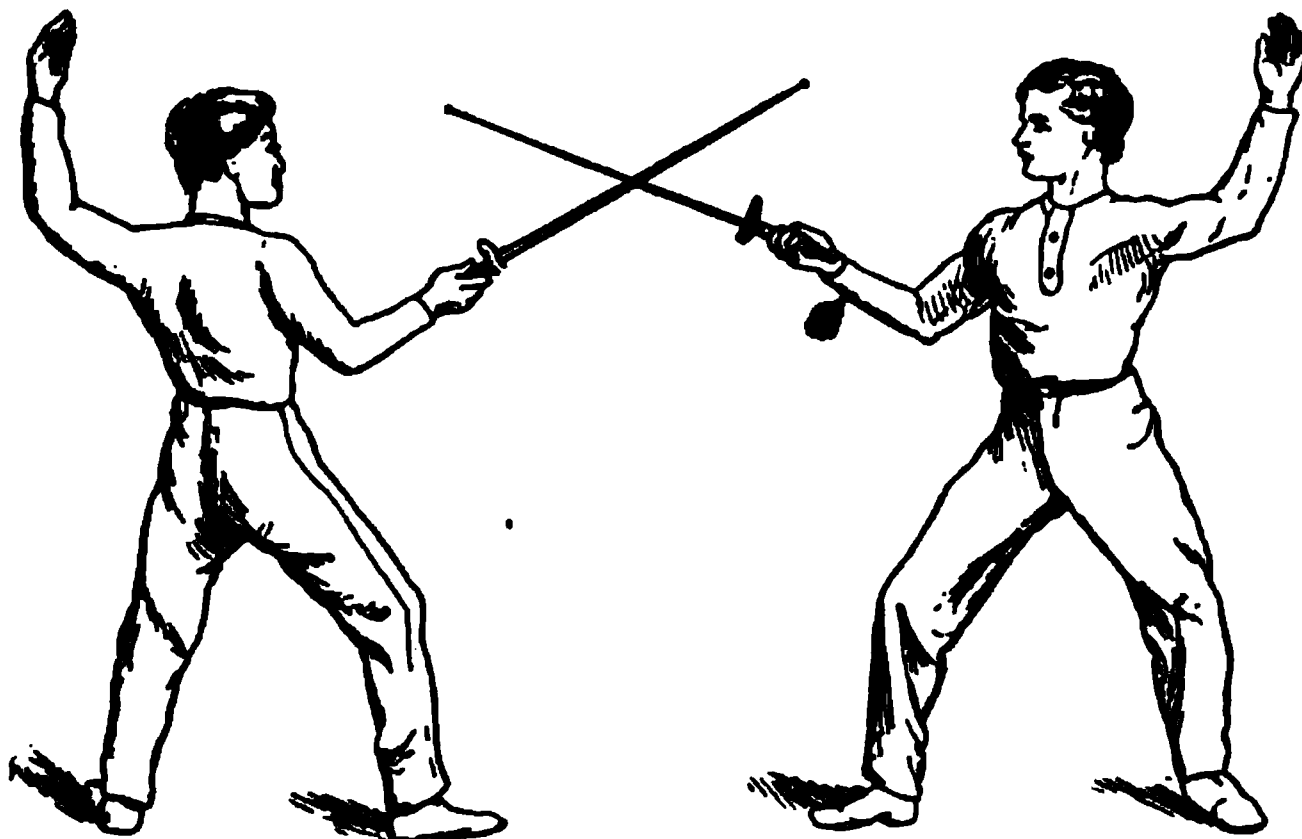


Fig. 8.—Engaged in Carte.

lows with the left, so that the distance between his feet remains the same. In retiring, the left foot makes the first movement.

The thrusts usually take their name from the position of the fencer when he makes the lunge. Thus the straight thrust in carte is made

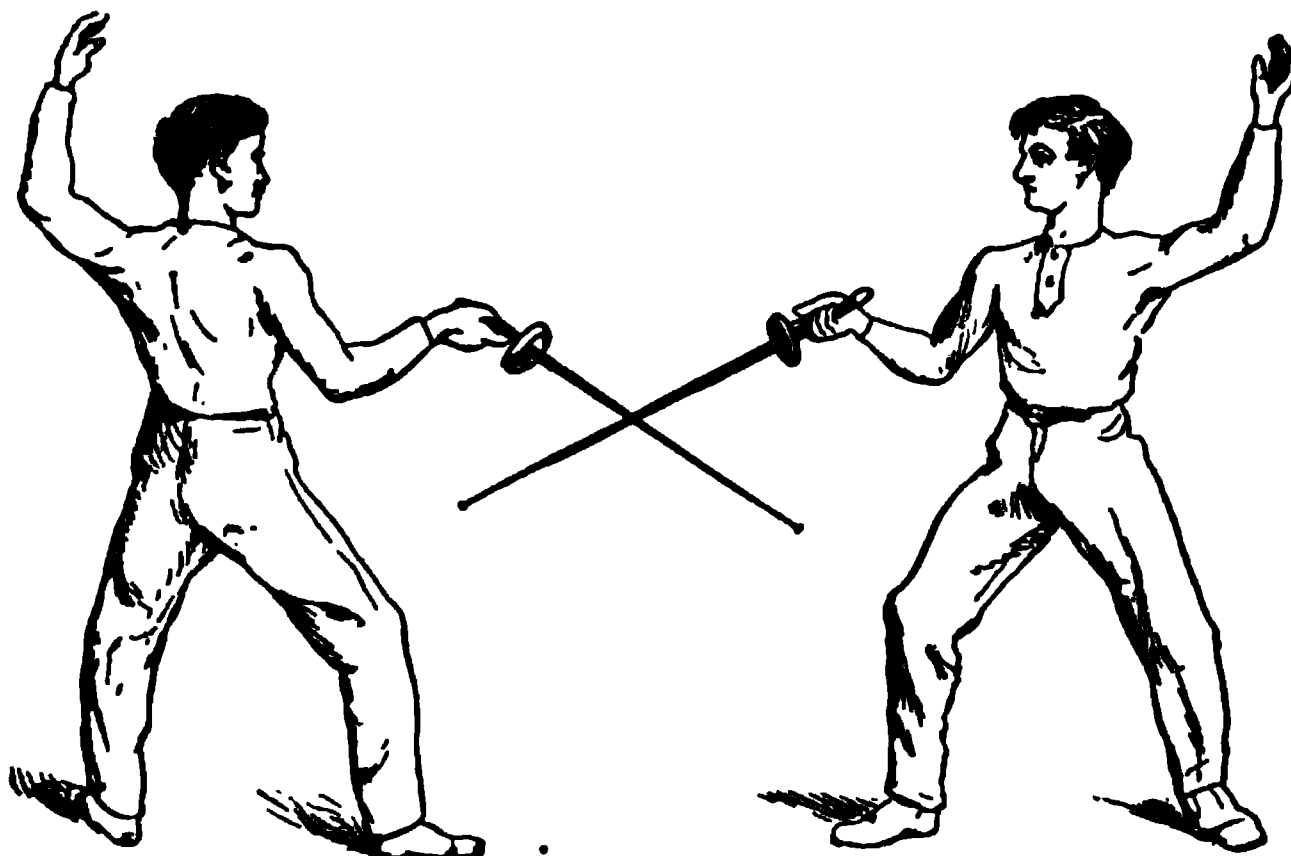


Fig. 9.—Guard of Octave.

from the engage in carte. Whenever the fencer sees that his opponent is not "covering" or protecting himself, there is said to be an "open-

ing." In like manner, the semicircle thrust (also called low carte) is made from the semicircle guard, and the octave thrust in like manner.

The thrust in *carte* over the adversary's arm is made from the guard in tierce and differs from the thrust in tierce only having the nails turned upward. The thrust in second is made from the engage of tierce by dropping the point of the foil under the adversary's wrist. The fencer sometimes recovers from a thrust to the same guard as before, and sometimes to a different one. What is called the Time-thrust is made when an adversary is dilatory or not well covered. It is made by opposing the adversary's foil strongly, and then lunging quickly.

Parades. The simplest parades are those of *carte* and tierce, which

are called upper parades. That of *carte* is made from guard in *carte* by throwing the hand about six inches inward making an upward turn with the wrist, and at the same time drawing the foil back slightly, thus throwing off the opponent's foil. The point of the foil, the body, and the legs should be kept in the same plane while executing the movement. The parade in tierce is likewise made from the guard in tierce by stretching the arm obliquely downward to the right about six inches. The parades of octave and half-circle are performed by bringing the foil into the positions of the octave and half-circle guards, and there turning aside

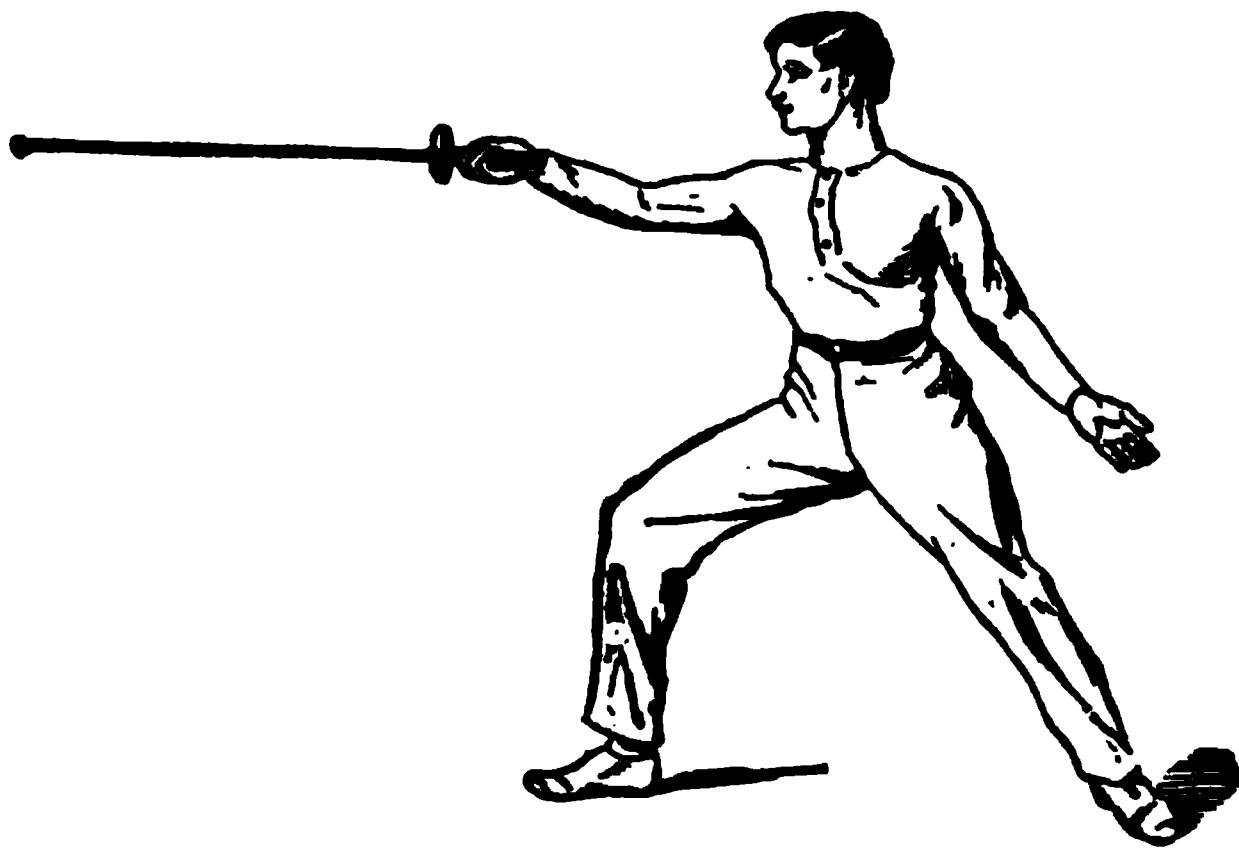


Fig. 10.—The Lunge.

the opponent's foil. The parade of prime is made from the engage of tierce by bending the arm and wrist, raising the hand to the chin, drawing the arm inward at the same time, and pointing the foil toward the lower part of the opponent's chest.

Counters, or Round Parades. These are performed by following the foil of the adversary in a small circle. For instance, being engaged in *carte*, if the fencer's opponent disengage he follows the latter's blade closely with his own by moving the wrist only, so as to join him again

in *carte*. The parade of counter tierce is made in like manner, only in the reverse direction. The half-circle, octave, and other counters are made similarly.

Feints, movements intended to deceive an adversary and force him to uncover himself. The feint of One, Two (sometimes called by the French name *Une, Deux*) is performed by two disengagements. For instance, when disengaging from *carte* to tierce, if the opponent takes the guard of tierce, the fencer may quickly disengage back to *carte* and

longe. The same feint in reverse order can be performed when engaged in tierce. The feint of One, Two, Three (or *Une, Deux, Trois*) is performed in like manner by three disengagements, the last accompanied by a longe.

Cut over the Point, a movement executed by a fencer when his opponent holds his hand low and the point of his foil high. Being engaged in carte, it is performed by raising the wrist so as to pass the foil over that of the adversary without exposing the body by moving the arm. At the same moment the thrust of carte over the arm is given. This is

called the cut over the point from carte to tierce (see Fig. 11); that from tierce to carte is performed in like manner.

Appels, Beats, and Glisades. These are movements intended to confuse an adversary. An appel is performed by beating on the floor with the right foot; a beat, or beat on the blade, is executed by sharply striking the adversary's foil; and a glisade by gliding the foil along that of the opponent, at the same time extending the arm.

The Salute. Previous to a fencing contest it is customary for the fencers to go through certain movements as

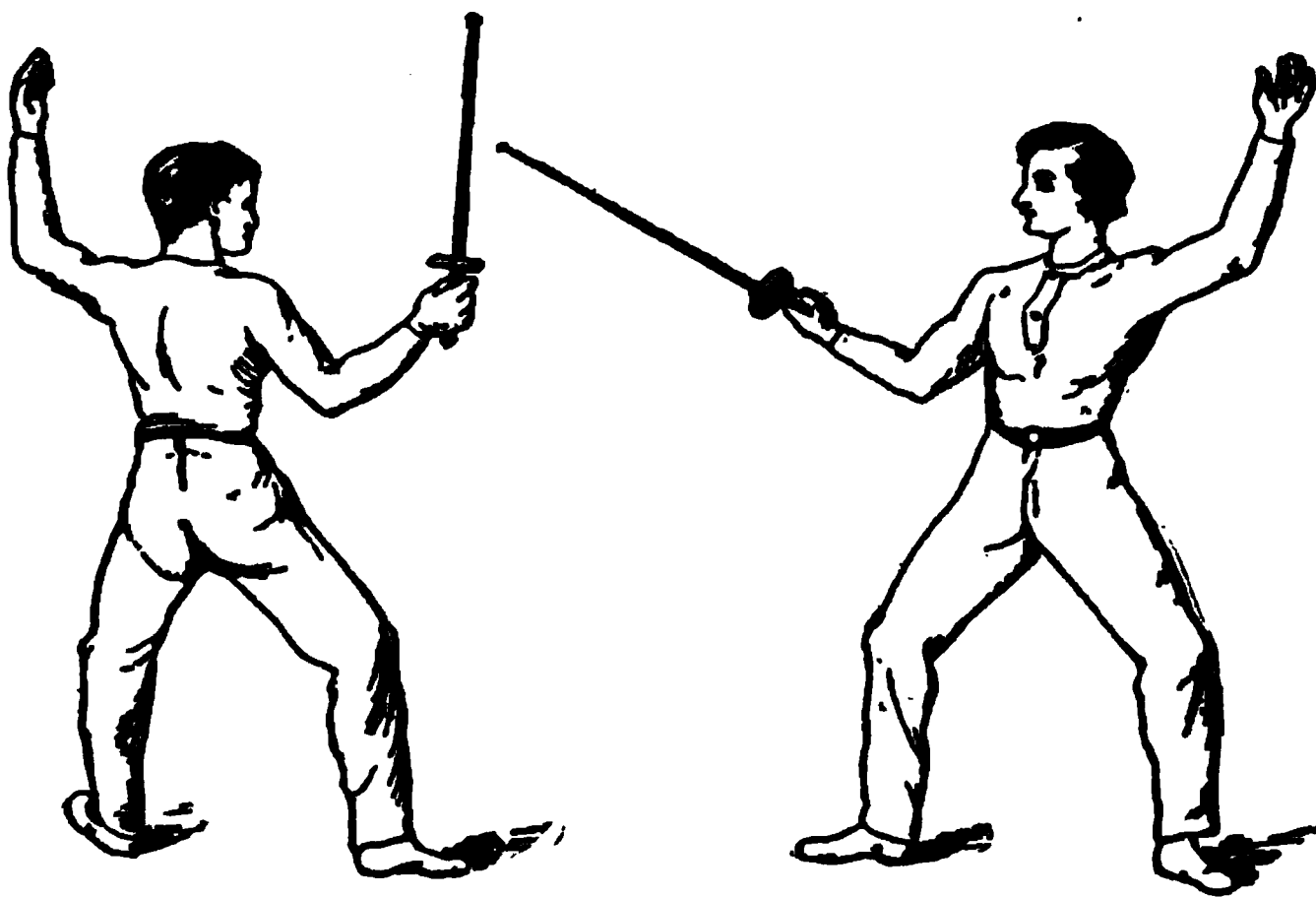


Fig. 11.—Cut over Point.

a form of courtesy (see Fig. 12). These movements are also useful as exercises for the learner. The first three positions having been taken as already described, the fencers take guard in tierce, each with his foil out of the line of his opponent's body, and then each beats twice with his right foot. One then asks the other to thrust first, whereupon the latter longes in carte, but without touching the body, by this means measuring his distance. After the one who thrust has recovered, each

brings his right foot up to the hollow of the left, drops his left hand, and brings his right hand under his chin, with the foil raised vertically. He then performs the parades of carte and tierce, bringing his hand under his chin again, at the close of each; then by a circular movement of both hands passes quickly to the guard of carte. The one who first thrust, now makes six disengages. At each disengage from carte to tierce, his opponent parries in tierce, at the same time turning the hand, nails

downward, and dropping the point of his foil. When the thruster takes guard in tierce the opponent engages, at the same time making an appel. Each disengage back to carte is similarly met, the foil being turned in a half circle, nails up, after the parry. After making the six disengages thus, the fencer feints One, Two, without thrusting, recovers in tierce, brings his right foot into the hollow of his left, and drops his left hand to his side. He then asks his opponent to thrust, and the whole salute is performed again, the movements being interchanged.

Skilled fencers do not put on the mask till after finishing the salute.

The Assault. A regular fencing contest in which each fencer tries to touch the other by using any of the movements described, in any order. In the assault each fencer should look steadily in his opponent's eyes, so as not to betray the movements he intends to make. It is well to act at first on the defensive to discover what are the favorite thrusts or feints of an adversary. At the same time the latter should use all the different movements, as much as possible, in order not to give such

Fig. 12.—The Salute.

information. A good fencer must not only be able to longe, recover, advance, and retreat quickly, but must also have what is called a good opposition; that is, he must always stand with his right side toward his adversary, and cover himself well with his foil. He must be able, by the pressure of his adversary's foil on his own, to tell what the latter intends to do, and must be able and ready to take advantage of all openings his adversary gives, without giving any himself.

The following examples serve to

show how some of the movements already described are used, and would be good for beginners to practice.

Ex. 1. The fencers engage in carte.

A drops his point and thrusts in low carte.

B thrusts straight.

A parries B's thrust in carte, and thrusts again in low carte.

B parries, disengages to tierce, and thrusts carte over the arm.

A parries, and having disengaged returns a thrust in carte.

B parries in carte, then drops his point and thrusts in low carte.

Ex. 2. Engaged in carte.

A retreats.

B advances, keeping on guard in carte.

A retreats again.

B advances, disengaging to tierce.

[B should advance at the same moment that his adversary retreats, and when the latter advances he should retreat.] Being engaged in carte again,

A thrusts in carte.

B forms the parade in carte and delivers its straight thrust.

A thrusts in carte again.

B throws it off as before, and, disengaging to tierce, thrusts carte over the arm.

A disengages and thrusts carte.

B parries in carte, disengages, thrusts carte over the arm.

A parries, and thrusts in tierce.

B makes the parade in tierce, and delivers a straight thrust.

Ex. 3. Engaged in carte. B holds guard low and point high.

A cuts over the point and thrusts carte over the arm. Engaged in tierce.

B disengages and thrusts carte.

A parries with octave.

B disengages over A's arm as he recovers, and thrusts in low carte. Engaged in carte.

A feints One, Two, and thrusts.

B forms counter-parade in carte, and gives a quick return thrust in low carte.

A makes an appel, at the same time beating on B's blade, and then thrusts straight carte.

B parries, and disengages.

A counters, performs a glizade, drops his point, and thrusts in octave.

It is good practice for one of the fencers to make all his thrusts, feints, etc., while the other simply remains on guard, using the proper parades as he needs them. The second fencer should then thrust and the first parry.

In fencing matches, the con-

testants fence for a stated time, and he that makes the greatest number of hits in that time is declared the winner. The hits are sometimes required to be within certain lines, which are chalked on the breast. If one fencer hit the body and the other the mask at the same time, only the hit on the body is counted. If one of the fencers drop his foil, any hit made by his adversary, after seeing the foil drop, is not counted, but a hit is good if made before seeing it drop.

RULES.

The following rules for fencing matches are those of the Amateur Athletic Union, and were adapted from the rules of Adolph Ruzé of Paris.

1. *Jury.* The jury is formed of at least three members, who judge without appeal.

2. *Position.* The jury must place themselves on both sides of the fencers, looking toward their chests, so as to judge as well of the value of the touch as of its artistic quality.

3. *Director of the Competition.* A director shall be chosen from among the members of the jury, who shall always give the signal to begin the assault.

4. *Stopping the Assault.* When any member of the jury shall call "Halt!" the contestants must take the first position and lower the points of their foils.

5. *Formation of the Bouts.* Competitors to fence according to drawing. The committee in drawing lots for the preliminary bouts will endeavor to arrange them so that members of the same club shall not be drawn against each other. In the finals, however, the order of bouts will be No. 1 to fence with No. 2, and so on through the list.

6. *Odd Number of Contestants.* Rule to be "miss and out"—i.e. the beaten contestant retires entirely from the contest. If the number of the contestants is odd, one of the defeated will be drawn to fence the

odd man; if beaten, the odd man retires also.

7. *Winner of Bout.* The contestant making the first five touches to win his bout.

8. *The Question of Artistic Merit.* The jury in deciding the bout can add one point to the losing contestant if they think his general form in fencing superior to his opponent. Should the score, by addition of this one point be made equal, they shall fence for three more points. This method of judging is based upon the idea that the contest is intended as an exhibition of skill rather than the mere securing of points.

9. *Value of a Touch.* Touches to count only when made upon the body within the limits defined by a cord sewed on the fencing jacket, under supervision of the committee. Any contestant, however, who shall turn his back on his adversary, during a bout, shall forfeit one point for each offense.

10. *The Avoided Touch.* Whenever there is a clear intention on the part of the one touched to avoid the point, either by a movement of arm or body, his adversary shall score one point.

11. *Slap and Touch.* A touch is of no value when the point is twisted on the body after the slap of the foil.

12. *Foul Touches.* A touch, whether fair or foul, stops the riposte (the return thrust).

13. *Simultaneous Attack.* Double-touches, occasioned by both contestants lunging at the same time, are considered bad form, and in case of second offense, one point shall be deducted from each contestant. This punishment consists in increasing the fatigue, imposing upon both contestants the obligation of regaining the point taken away.

14. *Validity of the Attack in the Double-touch.* From the point of view of skill, the party attacking with the hand high and in opposition is always in the right, and his blade

should be parried by the party attacked, in order to avoid the double-touch.

The stop touch is allowed when the attack is in the low line and not in opposition.

Double-touches are in general annulled.

15. *Renewal or Delay of the Attack.* The touch scored in the renewal or in the delay of the attack is valuable if the parry made to the first attack has not been followed by a riposte, or when the riposte has been slow.

16. *Corps-a-Corps.* The jury stop a *corps-a-corps* as soon as made, since it may serve to cover irregularities.

17. *Of Contestants at Close Quarters.* When one of the contestants shall be driven into a corner, the director shall halt and replace them so as to leave ample space behind each, and so that the precept "to retreat is not to flee" may be applied.

18. *Disarmament.* A disarmament shall not count a touch, but a touch scored immediately following upon a disarmament shall count.

19. *Changing Fencing Hand.* Each contestant must fence throughout the contest with the hand he begins with.

20. *Costume.* Each competitor shall wear a dark fencing jacket and dark trousers, so that the white chalk marks can be easily seen.

Each competitor shall also wear in the foil contest a fencing belt not exceeding four inches in width.

21. *Space.* Space allowed contestants to fence in shall be thirty feet in length.

22. *Conclusion.* See that the meetings do not relapse into a hand-to-hand struggle, that it be an exact representation of the art and beauty of fencing.

History. Fencing was practiced in ancient times as a means of attack and defense with swords, and exhibitions of it were given in the

Roman arenas by gladiators. It afterwards fell into disuse when the custom arose of protecting the body by heavy armor, but when armor was abandoned it came again into fashion. The continual brawls and contests between factions in Italy made it a necessary part of every one's education there, and Italians became very expert fencers. It was imported thence into Spain, France, and England. The sword used by the Italians was the rapier, which was long and flexible, with a sharp point, but no cutting edge, and modern fencers always use foils shaped like the rapier unless some other shape is specially mentioned.

Fencing may be practiced with a broadsword, bayonet, or stick, but the method in these cases differs somewhat from that described above. In the old Italian school of fencing there were eight kinds of parries, called *primo, secondo, terzo*, etc. (first, second, third, etc.), and from these the French terms now used are derived. The early Italians and Spanish aided the management of the sword with the dagger and cloak, and allowed the fencer to shift his position to the right and left in making his defense; but when fencers became more expert, and attacked with greater velocity, the dagger and cloak became an incum-

Fig. 13.—Fencing about 1600.

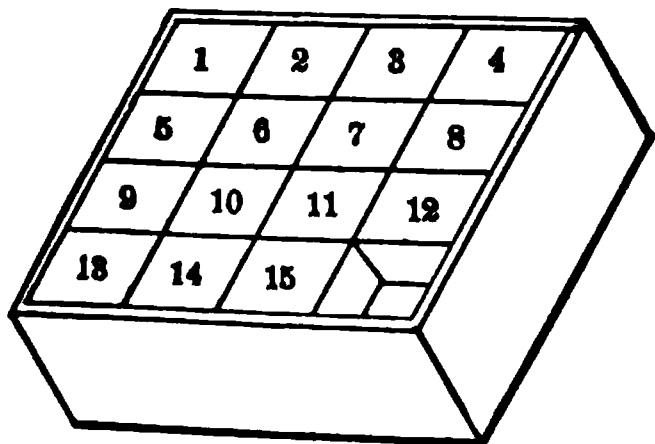
brance rather than an aid. The rapier became a favorite sword for duels, since it was the fairest to both sides, as it depended least on mere brute force. Before its introduction into England in Elizabeth's reign, duels were fought without regard to equality of arms, and any advantage, fair or unfair, was seized upon at once. Though dueling is wrong, fair fighting is to be preferred to unfair, so the introduction of fencing with the rapier did much for civilization. Now that duels are not fought, there is no use for the rapier as a weapon, since soldiers do not wear it, but fencing with the foils is still a favorite exercise, and fencing with the heavy swords used by

soldiers is, of course, taught them. Fig. 13, taken from an old German book, published in the 17th century, shows two fencers of that date.

Authorities say there is no single exercise which combines so many advantages, as fencing, since it brings into play the muscles of every part of the body, expands the chest, distributes the circulation equally, and gives delicacy of touch, while rendering the hand steady and light. In 1536 a book on the art of fencing was published by a Venetian named Marozzo, and since his time many works on the subject have appeared, one of the best of which is the little handbook in the "All England" series (1889).

FIFTEEN IN A ROW, a SOLITAIRE game of CARDS, played with two full packs. At the beginning of the game all the cards are laid on the table, faces upward, in rows of 15 each, the last row containing but 14. The cards of each lower row lie partly on those of the next row above. The player's object is to build up the cards in families, by suits, upward from four Aces (one of each suit) and downward from the four corresponding Kings. For this purpose one can begin with any independent card, that is, any card that has no other resting on it. Any independent card may also be placed on any other independent card of the same suit, just above or just below it in rank. At the beginning of the game only the cards in the lowest row are independent, and if there are no Kings or Aces there, and none can be freed, they may be taken from the next higher row and their places filled by pushing up the cards just below, until one King and one Ace have been obtained to begin building up the families. When all the cards have been removed from any line it is called a Street, and any independent card may then be placed in it. If the families can be completed the player wins.

FIFTEEN PUZZLE, a SOLITAIRE game played with fifteen numbered



Fifteen Puzzle.

blocks of wood in a shallow box, arranged as in the figure.

The object is, having first arranged the blocks in any order desired, to bring them into the order represented

above simply by sliding them past one another, without taking any from the box. We learn by the rule of permutations in arithmetic that 15 numbers can be arranged in no less than 1,307,674,368,000 different ways. In half of these arrangements the game can be won, and in half it cannot. To find whether any given arrangement can be solved or not, write the figures on the blocks in a straight line, as they occur in the box, and then bring them back to order by changing the places of two adjoining ones at a time, as illustrated below. If it requires an even number of changes, the game can be won from the arrangement, if an odd number, not. Thus suppose the arrangement is as follows:

Write the numbers thus, 1 2 3 7 5 4 6 8 9 14 15 12 13 10 11. Find the number of changes, two by two, necessary to correct the order. To bring the Four into place it must change places, first with the Five and then with the Seven, that is, two changes are required. In like manner, the number of changes required to bring each of the numbers, in order, into its proper order will be found to be:

To bring the 4 into place 2

" " " 7 " " 2

" " " 10 " " 4

" " " 11 " " 4

" " " 12 " " 2

" " " 13 " " 2

Total, - - - - - 16

an even number.

The game can therefore be won by this arrangement.

The player must remember that each number must be changed only with an *adjoining* one; thus, it would not give a correct result to exchange the Four and Seven at once, and call that *one* change. The best plan is to write the numbers on bits of paper, so that they can be shifted about easily.

Trial will show that although the necessary number of changes varies

with different ways of changing, it will always remain even or odd, as the case may be. The reason that the arrangements with an even number of changes are the only soluble ones is that the blocks can be moved about only in such a way as to give an even number of changes. The learner can convince himself of this by trial, remembering always to arrange the blocks so that the right hand lower corner is vacant, before counting the changes. As any even number of changes can be made, any odd arrangement can be brought down to that in which there is only one more change necessary; but one being still an odd number, that change can never be made. Thus, if the last line reads 13, 15, 14, while the rest of the blocks are in order, it is impossible to win the game.

The Fifteen game was invented in this country, and became very celebrated about 1880. Before its properties were studied many people wasted a great deal of time in trying to win it from impossible arrangements.

FILBERTS, Experiments with. Minute dents are often seen in the ends of filberts. These dents are the ends of very small channels which lead completely through the nut. If one of them be pricked with a pin and the end of a hair inserted, it is possible, with great care and patience, to push the hair quite through the nut. Necklaces of filberts, strung on hairs in this way, have been made, but the experiment succeeds only after many trials and with great patience.

FIRE-DRAWINGS. Make a solution of saltpetre in water and with a splinter of wood draw designs, figures, or letters on a piece of unglazed paper. When dry, the paper will appear as if nothing were on it. If a glowing coal be now touched to part of the design it will take fire, burning with a good deal of smoke, but no flame, and the fire will trace out the design marked on the paper,

not burning any part untouched by the saltpetre. The design, of course, should not be interrupted, but must

Fire Drawing.

be in continuous lines. The illustration represents the drawing of an elephant thus made.

FISH, FLESH AND FOWL. See THREE ELEMENTS.

FISHING. Fishing with hook and line is called angling, from angle, the old name for a hook.

Hooks are of various shapes and are generally known by the name of the place where they were originally made, as the Limerick or Aberdeen hooks; by the name of the maker, as the Kirby or O'Shaughnessy; or by the fish they are intended to catch, as Bass, Salmon, or Trout hooks. Among the hooks shown on the next page are the New York trout and bass hooks (Figs. 11 and 12), the Kirby bowed (Fig. 4), the Carlisle (Fig. 13), the Aberdeen (Fig. 7), the Kinsey (Fig. 2), and the Sneek (Fig. 9). Hooks may be either hollow-pointed, like the Limerick (Fig. 3), or bowed, like the Kirby (Fig. 4), but Kirby hooks are also made hollow pointed. As a rule a straight hook is the best; that is, one whose point is in line with the shaft and not kirbed or bent to one side, for it more surely hooks the fish. Most kinds of hooks are now made with ringed ends, flatted ends, knobbed ends, or plain ends. Limerick hooks formerly always had plain ends, but are now made also with

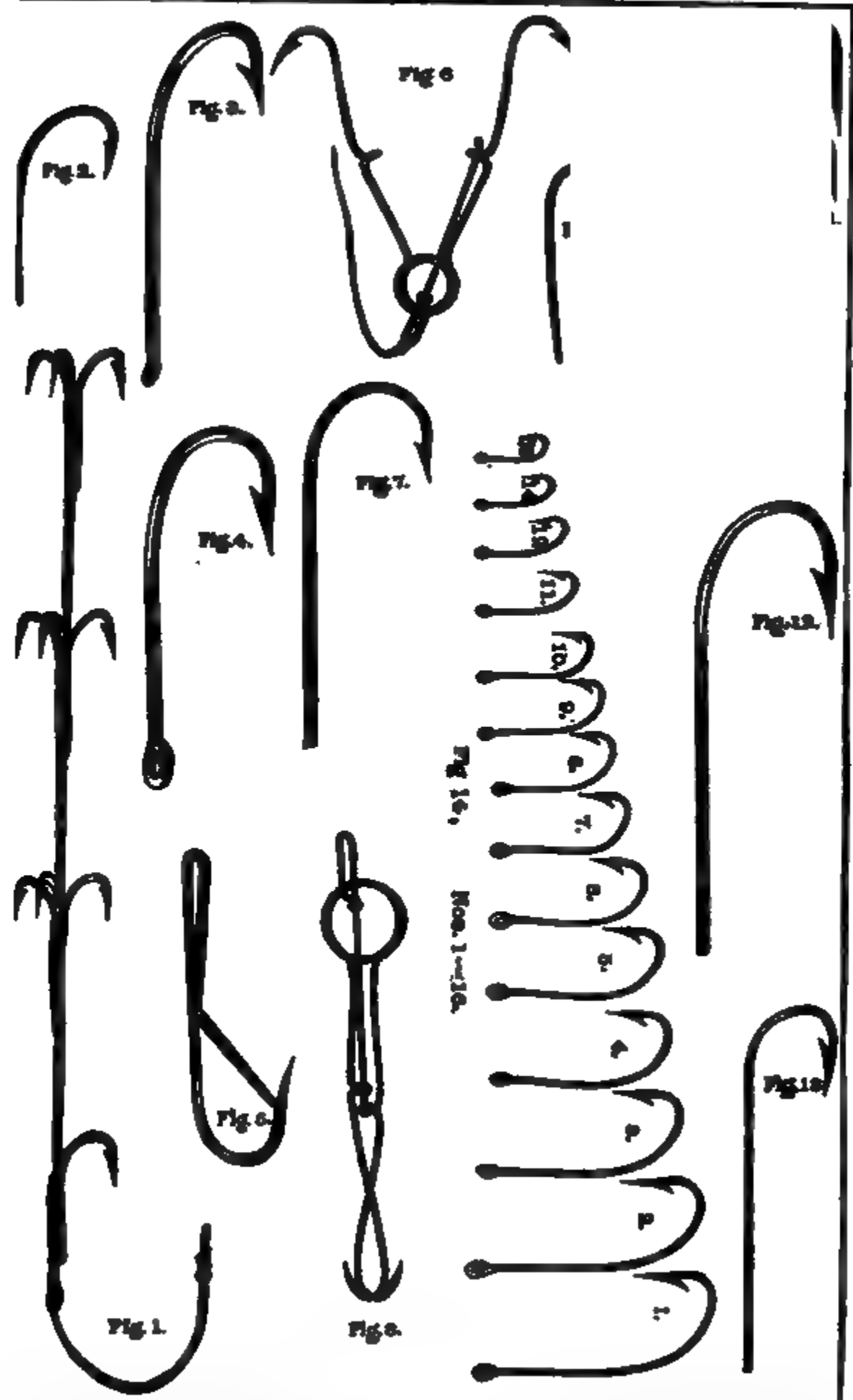


Fig. 1. Gang-hooks. Fig. 2. Kinsey hook. Fig. 3. Limerick hook. Fig. 4. Kirby hook. Fig. 5. Barbless hook. Fig. 6. Snap-hook, open. Fig. 7. Aberdeen hook. Fig. 8. Snap hook, shut. Fig. 9. Snuck hook. Fig. 10. Treble hook. Fig. 11. New York trout hook. Fig. 12. New York bass hook. Fig. 13. Carlisle hook. Fig. 14. Jizes of hooks, 1 to 16.

ringed ends, as shown in Fig. 15. The Barbless hook (Fig. 5) has, instead of a barb, a sharp piece of wire extending across the opening of the hook, making it almost impossible for a fish to escape after he has once hooked himself, but such hooks

hooks are the other in s" (Fig. 1). Now the sizes are denoting hooks are in- without bait. ch two kinds has on it a



Fig. 15.—Sizes of Hooks.

are little used. The snap-hook (Fig. 8) has two hooks, which are set together like a trap, and which spring apart (Fig. 6) after they are in the fish's mouth, thus holding him securely. The treble hook (Fig. 10) consists of three hooks fastened to-

Fig. 17.—Squid.

shaped some- of a spoon. idly through rls, and as it e fish, which ught by the ing is called ul with blue l, and other ing several s are often The line is k by a little : hook twirls e.

e-fishing has its shank covered with a cigar-shaped piece of white metal called a squid (Fig. 17), which is sometimes covered with eel-skin, with the silvery

side outward. The squid, which is often shaped like a little fish, glistens when drawn through the water, and attracts the fish just as the spoon-hook does.

Snells. The end of the hook is generally attached to a piece of fine silkworm gut called a snell, which, being hard to see under water, prevents the fish from discovering that

a line is fastened to the hook. Hooks may be bought already attached to snells, which are either single or double. Instead of snells, some hooks are fastened to gimp (a kind of coarse thread), and hooks for catching very large fish are attached to wire.

Lines. Fish-lines are made of linen, hemp, silk, or hair, and cheap

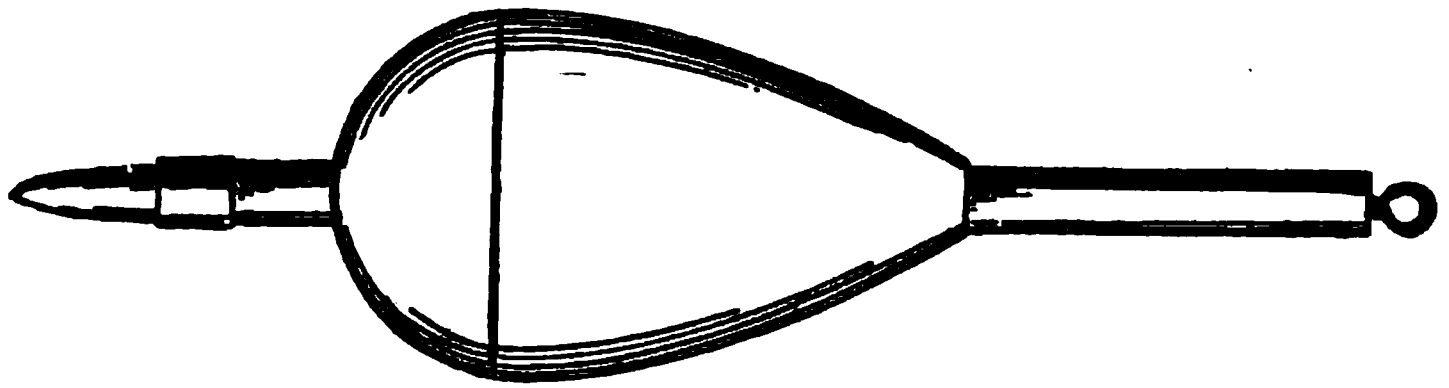


Fig. 18.

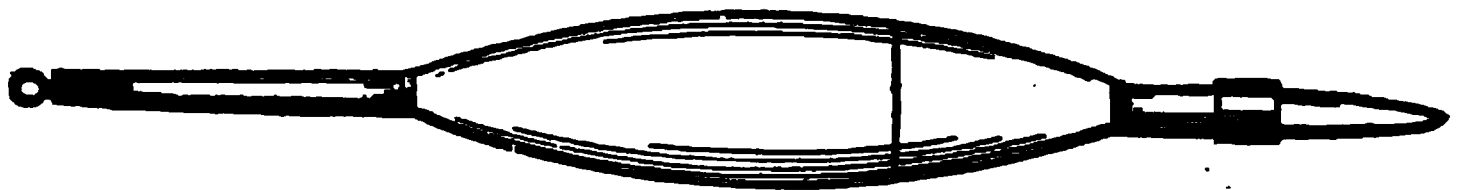


Fig. 19.



Fig. 20.

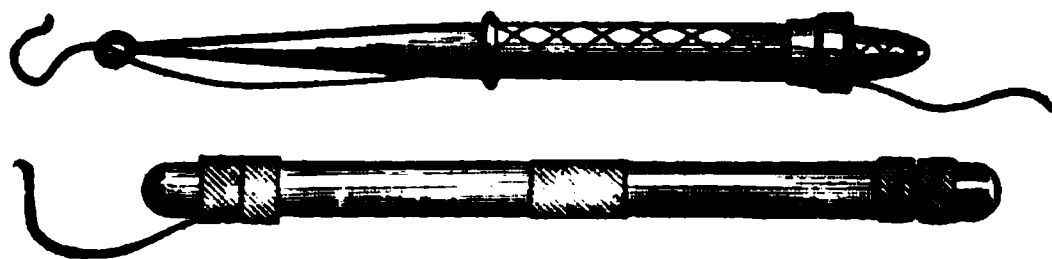


Fig. 21.

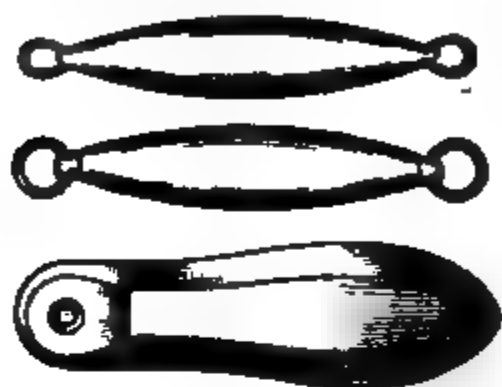
Floats.

ones of cotton. For small lake or pond fish, linen or hemp is generally used, and for salmon or trout, braided silk or silk and hair. In fishing from a boat, in a lake or on salt water, the line is generally held in the hand, but in fishing from shore it is usually attached to a rod.

Sinkers and Floats. The simplest sinkers are little pieces of sheet lead fastened to the line by pounding them around it, or bullets cut in half,

and the simplest floats are ordinary bottle corks tied to the line, but one can buy both floats and sinkers. Most floats are made of cork and quill, and are intended to be fastened to the line at both ends. Fig. 18 is called an "egg-shape" float, and Fig. 19 a "barrel shape." Fig. 21 shows adjustable floats, with the manner of placing them on the line. Figs. 22-24 show different shapes of sinkers.

Rods are made of any tough and elastic wood. For fly-fishing, split bamboo is best; for other kinds of fishing, lancewood, ash, or hickory



Figs. 22, 23, 24.—Sinkers.

may be used. A good bamboo rod weighs from 4 to 12 ounces and is from 8 to 13 feet long. What are called double-handed rods, for catch-



Fig. 25.
Ring Guide.



Fig. 26.
Tie Guide.

ing large salmon, may be 20 feet long and weigh two or three pounds. Rods are usually made in sections or joints, which can be taken apart and carried easily. In the simplest kind of still-fishing, the line is fastened directly to the end of the rod, but it is better to wind it on a reel, fixed on the rod where the angler can reach it, running the line through little guides on the rod, till it reaches the

tip. The length of the line can thus be varied at will by winding up the reel. The guides through which the line passes are either "ring guides" (Fig. 25), being fastened to the rod by rings around it; or "tie guides" (Fig. 26), which are tied to the rod.

Reels are of many kinds. Most of them are operated by turning a

Fig. 27.—Automatic Reel.

handle, but there are "automatic" reels containing a spring *A*, which winds the line when the angler presses a lever *C* (see Fig. 27).

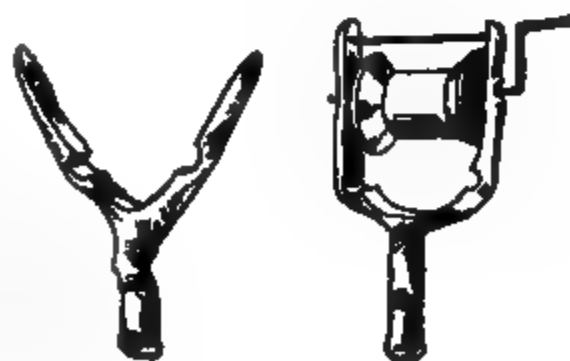


Fig. 28.—Home-made Reel.

The line passes through the guide *B*, and the reel is fastened to the

pole at *D*. A home-made reel (Fig. 28.) can be constructed by fastening an ordinary spool between the prongs of a forked stick which are tied together at the top with string or wire. The spool is fitted with a crank made of wire.

Bait. The bait may be something on which the fish naturally feeds, or anything resembling it. The bait used for each kind of fish is described below. The most common baits for fishing near shore are the ordinary earth-worm (called angle-worm because it is so often used in angling), live minnows, the grubs or larvæ of insects, grasshoppers, and artificial flies. In some

places, especially in Europe, what are called "pastes" are used for bait. There are many kinds, some of the most common being made of wheat boiled in milk, or bread and bran softened with water and made into balls. In salt water fishing, sand-worms, pieces of raw fish, clam, lobster, and the little crabs called "fiddlers," are also commonly used.

For most fishes the bait should be put on so as to conceal the hook as much as possible, but some are so greedy that they will bite even at a hook without bait. In baiting with worms, the hook should be run through the worm lengthwise until it is hidden, leaving a little hanging

Fig. 29.—Fly-book.

from the point. Small fish are usually placed on the hook by passing the hook through the body at the mouth and out at the tail. Artificial flies are also permanently attached to hooks, and are used for catching fish that will jump from the water at insects. The flies of which Anglers usually keep a variety, in cases called fly-books (Fig. 29), can be bought, or made at home, the materials being feathers, fur, hair, silk-worm gut, silk, and tinsel. The beginner may learn to tie his own flies from some experienced fly-fisher, but flies may be bought so cheaply that most anglers prefer to buy them ready-made at the fishing-tackle stores. They are not always made to imitate natural ones

exactly, though anglers differ as to whether fish bite better at imitations or not. Sometimes trout will rise at almost anything. Fly fishing is described more fully below.

Nets. The only net used by sportsmen is the landing net, to take a fish out of the water when it has been brought to the surface by means of the hook and line. It is merely a small net stretched over a hoop of wood or metal, and provided with a wooden handle.

A small net, called a scoop-net, much like a landing net, is frequently used to catch little fish in brooks, by boys for amusement and by older fishermen to obtain bait. A good scoop-net can be made by binding

together the ends of a forked sapling to form the main stem for the handle, and then sewing around the hoop a bag of mosquito-netting.

Spears. Eels, pickerel, and many other fish are sometimes taken with spears (Fig. 30), especially in winter, through holes in the ice, in the manner described below. The spear generally used is shown in Fig. 30. Spearing fish is to be good sport, but is generally condemned, as the law prohibits taking of fish in this way.

Fly Fishing. Before the angler can learn how to "cast" the artificial fly, he must learn how to "cast" the line so that the fly falls just where he wishes. The action of a real fly is imitated. The angler can throw out more than a hundred feet of line with accuracy. Thirty feet is generally enough for most wanted, and the use of but nine or ten feet can be learned on land, as well as in the water. To begin with, a square of line about an inch square is held to the end of the line. Holding the rod in the right hand, the reel on the under side, the angler draws out about ten feet of line with his left hand. Then, raising the piece of wood with the right hand, the line is taut. He then moves the wood and the elastic band, aided by a slight jerk, throws the line over

where it straightens out behind his back. This is called the "back cast." Before it touches the ground—better before the end is lower than his head—the rod is moved forward, casting the line straight out in front. The forward motion is made chiefly by the wrist. For the second back cast the line is raised directly from the ground, without taking hold of the piece of wood again. The line should be lengthened gradually, till twenty or thirty feet can be cast, and the learner should also practice casting at a mark, which may be any small object on the ground. In fishing from the bank of a stream it is important to know how to make the back cast without letting the line drop below the head, for otherwise it is likely to catch in bushes or shrubs. The beginner should, if possible, seek instruction from an angler when learning to cast the fly; once seeing it done is worth many pages of printed instructions.

In actual fishing, the angler casts his fly time after time till a fish rises to the surface and seizes it. Sometimes the fish will not bite unless the fly is dropped directly over their heads. As soon as the fly is taken, the angler must "strike," that is, raise the pole with a sudden jerk, to drive the hook into the fish's jaws, otherwise the fish may release the fly without hooking himself. When the fish is hooked it will try to get free, and here the skill of the angler shows itself. After allowing the fish to tire itself by lashing to and fro, and letting it unwind plenty of line from the reel, the fisherman draws it in by turning the reel crank, whenever the fish is tired enough to permit. But with a strong fish, he must sometimes let the line run out to prevent its being broken. This alternate pulling in and releasing is called "playing." Sometimes it is kept up for hours, until the fish is near enough to be taken from the water with a landing net, or, if it be a very large fish, with a big hook

on the end of a rod, called a gaff. "Playing" a fish is the angler's great sport. A fish may escape, after being hooked, by tearing itself from the hook, by breaking the line, or by cutting it against sharp rocks, and the angler should take care that the fish is not allowed to give a sharp and sudden pull.

Fish Spearing through Ice. A board shelter or cabin, of convenient size, which can be moved about from place to place on the ice, is sometimes built. It may be just large enough for the fisherman to sit in, say four feet high, and four feet square at the bottom, sloping to two feet square at the top, and usually has no floor (see Fig. 31). It must

is cut through the ice. Through this the fisherman lowers a line, having on its end a decoy fish. This may be easily made of a piece of pine, painted white, with the back dark gray, fitted with tin fins, and weighted with lead. The line is fastened to its back by a bent pin, and by experiment the fins can be so arranged that when the line is pulled up the fish will move ahead, as if it were swimming. The fisherman continues to move this decoy about in the water until he sees that it has attracted a fish. The decoy is now gradually lifted with the left hand and the spear is slowly lowered with the right till it is about a foot above the fish's back, when it should be given a sudden thrust. The line may be thrown over the knee and the spear managed with both hands. If the fish is caught, it should be put outside the door of the shelter. A cabin like the one described is comfortably warm, even when the thermometer is very low outside. Some fishermen build cabins having floors, seats, and a small charcoal or oil stove, so that a whole day can be passed in them. The best times for fish-spearing through ice are just before and just after sunset, during a snow-storm, or when the day is partly cloudy.

Fig. 31.—Frame of Spearman's Cabin.

be quite dark, so that the only light comes up through the ice, thus enabling the fish to be seen clearly. The fisherman sits on a box or block of wood, holding in his hand the spear, which has barbed tines. The handle, of spruce or light pine, and 9 to 12 feet long, projects through a hole in the top of the shelter, the light being shut out by a loose piece of cloth, tacked to the edge of the hole, and fitting closely around the spear handle. The cloth should be large enough to allow the spear to move from side to side of the hole, by wrinkling. In the middle of the cabin a hole about a foot in diameter

Snaring. Fish can be snared through the ice from a shelter like that used for spearing. The procedure is exactly the same, save that instead of a spear the fisherman uses a slip-noose made of fine copper or brass wire attached to the end of a line. The line must not be jerked with too much force, or the wire snare may cut the fish in two. Trout can be snared in like manner with horsehair nooses. In most of the States it is forbidden to snare or spear trout, bass, and other food fish; and anglers generally regard with disfavor any method of capture except with hook and line.

A mode of fishing sometimes practiced in the Southern States is called

"jugging." Five or six empty jugs are tightly corked, and floated in the water. To the handle of each is fastened a line about five feet long, fitted with a sinker and a baited hook. As the jugs float with the current, they are followed and watched by the fisherman. When a fish is hooked, the jug to which the line is fastened begins to bob up and down and darts about in all directions. Such a jug is at once pursued and the fish hauled in.

A device used by fishermen, in tending several set lines on the ice, is called a tip-up. In its simplest form, a stick is laid across the ice hole, and to it is fastened at right angles another stick a foot or two long, having the line fastened to one end, and on the other a small red flag. The flag rests on the ice till a fish is hooked and then it is waved up and down by the struggles of the fish, attracting the notice of the fisherman.

The following is a list of the principal game-fish of the United States, with a few words about each. The appearance of most of them is described in C. C. T., in separate articles.

FRESH-WATER FISH.

Dace. Among the first fish usually caught by boys in fresh water are the various minnows sometimes called shiners and chubs, the most common of which is the dace or roach. The dace is found in most of the brooks and ponds in New England and the Middle States, and is caught with a light rod, and worms or artificial flies as bait.

Sun fish, also called "Sunny," "Pumpkin seed," Pond Perch, Roach, and Bream. It is found in brooks over a large area in the United States (sometimes in salt tidal rivers), and is good eating. It is caught with small hooks and tackle, and worms as bait, and will also take the artificial fly. The blue sunfish, blue bream, or copper nosed bream is fished for in the Southern States with artificial flies and affords good sport.

The common bream of Southern waters is sometimes caught with a bait made of brown bread and honey.

Yellow Perch. This favorite of young fishermen is common in most parts of the Eastern States, and furnishes sport most of the year round, being taken in summer with worm or minnow bait. In winter it is fished for through holes cut in the ice, the bait then used being the white grub found in decayed wood. In the spring the perch will rise to the fly. In weight the perch rarely exceeds two pounds, though specimens have been caught of twice that weight.

Pike-Perch. This fish sometimes called the Glass Eye, Wall-eyed Pike, Ohio Pike, or Ohio Salmon, though it is neither pike nor salmon, is found in the Southern States, the great lakes, Western New York, and Canada. In Canada it is called the Doree, and another Canadian fish of the same species is called the Sandre. The pike-perch is bold and greedy and is readily taken with the hook, with almost any small fish for bait. In Lake Champlain it is sometimes caught by trolling. The weight of the pike-perch is from one to five pounds. Its flesh, which is white, is highly esteemed in the West.

Pickrel. The Pike or Pickerel family includes the Muskallonge or Maskallonge (sometimes called the 'Longe), and the Northern Pickerel, of the great lakes; the Common Pickerel, found in all the ponds and streams of the Northern and Middle States; the White Pickerel of the Ohio and other western rivers; and the Black Pickerel of Pennsylvania. They are all distinguished by length of body. The muskallonge, which, though of the pike family, is not a gigantic pike, as some think, attains sometimes a weight of 50 and even 80 pounds. The pike seldom grows to be more than three feet long, but the muskallonge has been known to attain seven feet, especially in the Michigan lakes and in the upper waters of the Mis-

Mississippi River. The finest muskallonge are caught in Rice Lake, Canada, and good-sized ones, though not the largest, in the St. Lawrence River. They are generally caught by trolling with a spoon. The common pickerel or pond pike is perhaps the commonest of all game fishes in the United States. It weighs, on an average, about five pounds. All the pickerel are voracious, and destructive not only to small fish but to frogs and water rats. There are many modes of catching them, and they will take almost any kind of bait, but they are caught best by trolling with a gorge hook, or fishing with a snap hook.

Cat-fish, Bull-head, Bull Pout, or Horned Pout. These, which are nearly related, are found in all North American waters. Cat-fish are found in the great lakes and in the West as well as in salt water, and bull-heads in most all fresh water. They have no scales, the skin being either naked or protected by large plates. The largest cat-fish weigh 150 pounds. The flesh of the smaller kinds is rich, and in some places is considered a great delicacy. All the cat-fish are greedy biters, and will take almost any kind of bait. The ordinary bull-heads of the Eastern States are caught on muddy bottoms with worms as bait; they bite best at night. The kind called "channel cat," found in the West and South, is very gamy and caught with heavy tackle and minnow bait. In the Southern States "jugging," described above, is a favorite method with the negroes of catching cat-fish.

Black Bass is found in many lakes and streams east of the Rocky Mountains, and is much prized as a game fish. It is often caught with minnows, frogs, or grasshoppers, or by trolling with a Spoon hook, but rises readily at an artificial fly. The rods used are about 10 feet long and stiffer than those used for trout. In weight the black bass runs from two to four pounds for full grown

fish, in Northern waters. Specimens have been taken weighing seven pounds and more. In the South, the fish are much larger. Florida bass have been caught exceeding twenty pounds. The colors of the black bass vary in different waters; they have received many local names. They are called Trout in most parts of the South, Chubb in Virginia, and Welshmen in the Carolinas.

Eels bite freely at worms, or bits of meat, and are also taken by spearing and by "bobbing." Eel bobs are made by stringing angle-worms in a bunch on a piece of stout thread at the end of an ordinary fish line. The eels bite at the bunch, and, their teeth becoming entangled in the thread, they are drawn ashore. Eels bite best at night and frequent muddy bottoms. Salt water eels are often captured in a sort of trap called an eel-pot.

The Sucker is very commonly found in fresh waters in the Northern States and is well known to country boys. It bites readily at angle-worm bait, and is often caught through the ice in winter. A favorite mode of capturing suckers is by means of a slip-noose of horsehair or copper wire, and they are also speared.

Carp was imported from Europe about 1855, and is now found in many Eastern waters, and also in California and Oregon. It frequents muddy waters, and is not readily captured by angling, though it will sometimes take worms, artificial flies, and a bait of flour paste.

Chub, Honey-head, or River Chub. This fish is widely distributed in fresh waters. It takes the hook readily, and is caught with worms or minnows, the tackle used being the same as for black bass.

Grayling. This fish is found along the Northern border of the United States, and catching it is considered fine sport. It is best caught with a fly, but bites also at worms and insects.

Salmon. The true salmon is

caught chiefly in Canadian rivers, and in the Penobscot River of Maine, from about the middle of May to the end of July, while on the way up from its annual visit to the sea, to deposit its spawn or eggs in fresh water. The fish deposit their eggs in the gravelly bed of the upper parts of the rivers in the autumn and then return to the sea. The young fish, when first hatched, are called Pinks or Paer, in their second year Smolts, and in their third Grilse. In fishing for salmon, artificial flies of various kinds are used.

Trout. The Speckled, Brook, or Mountain Trout, which ranks second only to the salmon as a game fish, also migrates, or visits the sea, when it is possible for it do so. It is found in clear, cold streams and lakes; and is caught with angle-worms, artificial flies, and minnows. In meadow brooks and mountain streams the fish caught do not average more than a pound in weight; but, in the rivers and lakes of Maine and Canada, speckled trout of four to six pounds are not uncommon, while specimens have been caught weighing ten pounds. The lake trout is found in the great lakes, where it is often called the Mackinaw trout, and in the lakes of Northern New York, New England, and Canada. In the great lakes it sometimes reaches a weight of forty pounds; but in the other localities named it is much smaller. The lake trout is taken by trolling with minnow or spoon bait, and also by still-fishing near the bottom in deep water.

White Fish, found in the great lakes, is much prized for food. It is caught usually in nets called "pound nets," from 500 to 1000 feet long. The net is stretched on poles, and ends in a pocket or trap, into which the fish swim and are caught by thousands.

SALT-WATER FISH.

The *Cunner*, also called the Salt-water Perch, Chogset, Burgall, Nibbler, and Blue Perch, is found in

great numbers along the coast of the United States. It is usually one of the first salt water fish caught by boys, and will bite readily at almost any bait. Clams' heads are often used. Light tackle is employed. Cunnners often annoy fishermen very much by nibbling off their bait, when they wish to catch larger fish.

Flat Fish are more gamy than the cunner, and excellent eating. They have flat bodies and large mouths. The tackle and bait are like those used for cunnners.

Flounder. This fish is taken all along the Atlantic coast, and bites best in spring and autumn. It is caught either with light tackle and clam or lobster bait, or in set-nets, and sometimes by spearing at night.

Striped Bass, or Rock Fish. Though a sea fish, it enters tidal rivers to spawn, and often runs up fresh water streams in search of food. Next to the members of the salmon family it is considered the best game fish in the United States. It attains sometimes seventy or eighty pounds, but those weighing about eight pounds have the best flavor. It bites at nearly every kind of bait, and even at a white rag or bit of cotton, and it can also be caught with the artificial fly. A line baited with small fish is often cast directly into the surf, as in fly-casting. In trolling for it, the best bait is the minnow. Great care is necessary in landing the fish after it is hooked, for it is very strong, makes long and rapid runs, and is not easily tired. The Sea Bass, also called Black-fish, is caught on the coast of the Northern States in May, June, and July. It is sometimes caught from the shore, but generally from boats at some distance from land. It bites best at the turn of the tide, and is caught with black-fish tackle, and clams or shrimp for bait.

Sea Chub. This fish is common in the South and occasionally appears as far north as New York. It was found there in abundance during the visit

of Gen. Lafayette to this country in 1836, and hence is often called the Lafayette. It is prized as a delicacy.

Weak Fish. It is found on almost all the coasts of the United States between June and December. In the South it is often miscalled Trout, which fish it much resembles in flavor. Its weight is generally from a few ounces up to seven or eight pounds, and it is asserted that sometimes weighs 25 to 30 pounds. It is caught during flood tide, usually with clam bait. A large hook of fine steel is used on account of the fish's large mouth and soft jaws. The same tackle is used as for black bass. Weak Fish must be eaten within three or four hours after it is caught, as its flesh soon gets soft. Some say that the name "Weak," was given because the mouth is easily torn by the hook; some that it is a corruption of "Wheat Fish," since it is caught when wheat is ripe; and others assert that it is corrupted from the original Indian name, Squeteague.

Sheepshead. This is naturally a Southern fish, but is taken along the coasts of the Northern States from June till October. It generally weighs seven or eight pounds, but sometimes as much as seventeen. It has a head sloping abruptly to the snout and large oblong scales; is of a dull silver color with coppery gleams, and has five dark arched bands across the back and tail. Its head and forehead are black and the chin is marked with patches, which, with its peculiar profile and prominent teeth, give it a fancied resemblance to the head of a sheep. It a wary and hard fish to hook and to land. Sheepshead is delicious eating and highly prized by epicures. Special hooks are made for sheepshead fishing; clam, crab, or fiddler bait is the best. Sheepshead are found about wrecks, sunken timbers, the piles of wharves, or on a rock bottom, and hand-line fishing is commonly practiced, though the use of rod and reel affords better sport.

Scup, or Scuppog. It is called also the Porgie, Porgy, or Paugie, and is found all along the Atlantic coast. It is caught generally from a rowboat with a hand line, a medium sized hook, and a sinker heavy enough to carry it to the bottom. Clam bait is commonly used, though the fish bite well at shrimp.

Blue-fish. It is called also the Skipjack, and sometimes the Horse Mackerel, or the Snapper, is found on the American coast from Brazil to Massachusetts, and is common also in Europe. Full-grown Blue-fish are one to three feet long, and weigh four to ten pounds. They are usually caught with a squid, as described above, trolled from a sailboat, or thrown out and drawn in from shore. They often run in "schools," through which the fishermen sail to and fro, trolling their lines, and taking the fish with great rapidity. They swim near the surface, and leap at any living thing they see. When fresh from the water they are delicious eating, but their delicate flavor is lost if they are kept more than a few hours. Small blue-fish are caught from the shore in New England, during the early autumn, with light tackle baited with clams or minnows, at which they bite greedily.

Mackerel are commonly taken in seines, but may be caught in much the same way as blue-fish, though the squids used are smaller. They will bite also at hooks baited with small bits of mackerel skin, or even with bits of white or red cloth.

Smelts. These fish are taken along the coast north of New Jersey in large seines, but will bite also at hooks. They run up the rivers to spawn like salmon, and in Maine and the British provinces they sometimes pass their lives wholly in fresh water. Smelts are caught in Maine, through the ice, with what is called the "umbrella tackle," consisting of an arrangement made like an umbrella frame without the handle. To the end of each rib hangs a short line

with a hook, and the whole is suspended from a fish-pole by a single line, fastened at the place where the top of an ordinary umbrella handle comes through.

Herring. This fish, which runs into the mouths of all the northern and northeastern rivers of America, is greatly sought for food. It is usually caught with a net, but may be angled for with an artificial fly in the spring. It is colored blue above and silvery white below. The shad, which is of the same family as the herring, is likewise generally taken with a net, but can sometimes be caught with the fly, affording excellent sport. The shad is a dusky blue above, with brown and green tints. His sides are silvery white, with a tinge of copper color. It is considered by many the most delicious of all table fish.

Tautog, or Black-fish. It is found from South Carolina to Massachusetts Bay, and is usually caught best near rocks, sunken wrecks, or deserted docks. The grounds it frequents are often "baited" by throwing crabs or clams into the water, in hopes of enticing it to come there to feed. Black-fish usually weigh two to ten pounds. The ordinary bait is soft clams, fiddler crabs, or bits of lobster. Two hooks are generally used, with snells of twisted gut, one twelve, and one fifteen inches long. Either hand-lines or rods are used.

Fish caught in deep salt water, such as the Cod, Haddock, Whiting, and Halibut, are not usually classed as game fish, being caught chiefly for a livelihood. They are sometimes taken for sport, but this consists merely in the frequency of the biting, for they offer little resistance, and are hauled in by mere strength. They are all found everywhere north of New York, and pleasure parties are sometimes formed to catch them. Cod and haddock are caught off Block Island, on the Rhode Island coast, salted clams or pieces of fish being used for bait. The line is a

heavy cotton one from 400 to 600 feet long, with a sinker weighing twelve ounces or more, and very large hooks.

FISH LAWS.

Most of the States have laws regulating the fishing for food and game fish. Thus, it is forbidden to capture trout, bass, and other fish by netting or spearing, or in any way except with hook and line. Fishing is permitted only during certain months, which are called the "open season." The State, county, and town laws are frequently changed, and, therefore, the table which follows is probably not quite exact. Some States forbid taking fish under a certain size or weight. In general, the purpose of the law is to forbid fishing methods that will destroy the supply. Heavy fines, and even imprisonments, are the penalties for violating the fish laws; but anglers consider it a point of honor to obey the laws and to influence others to obey them. The laws apply to fishing in private waters as well as in those that are public. The following table shows when fish are in season in States where the catching of such fish is regulated by law. To find what fish are in season in any particular month, the reader must look down the column under the name of the month. The fish, opposite whose names there is a black line in that column, are then in season. The shorter black lines mean first half of the month, when printed toward the left; and last half when toward the right. By beginning with the fish's name and following the line toward the right, it can be seen, in like manner, during what time it can be legally taken. For instance, the table shows that the trout season in Illinois begins on February 15, and ends on June 15. These times are only approximately correct, as legislatures are constantly changing them. The sportsman to be absolutely safe should therefore make special inquiry in each case.

	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Perch.												
Maine												
New Hampshire.....												
Herring.												
District of Columbia.....												
Smelt.												
Maine (except by hook and line).....												
Massachusetts												

Trespassing. If the bottom of a stream is owned by any one, as it is in some cases, the owner alone has the right to fish in it, even if it is deep enough to float a boat. If it is not deep enough for boats, then the right belongs to the owner of the land on the nearest bank, no matter how wide the stream might be. In tide water, the right to fish belongs to the State, and it is usually free to all; but in some cases the State grants it to particular persons. When a person fishes in water without the permission of the one who owns the right to do so, he is a trespasser. What has been said on this subject, under HUNTING, applies to fishing also. Some States have made special laws on this subject, but in general the law is as it has been given above.

History. The earliest tribes of men caught fish with what are

for the line. The bait was put on so as to cover the gorge, which turned, after it was swallowed, across the fish's gullet and held it fast. One of these gorges, dug up in France, was used in what is called the Stone Age, before man understood the use of metals, and is estimated to be eight or nine thousand years old. Later, in the Bronze Age, gorges of bronze were used, and then hooks of bone and of bronze (see Figs. 33-



Fig. 33.—Ancient Bone Hooks.

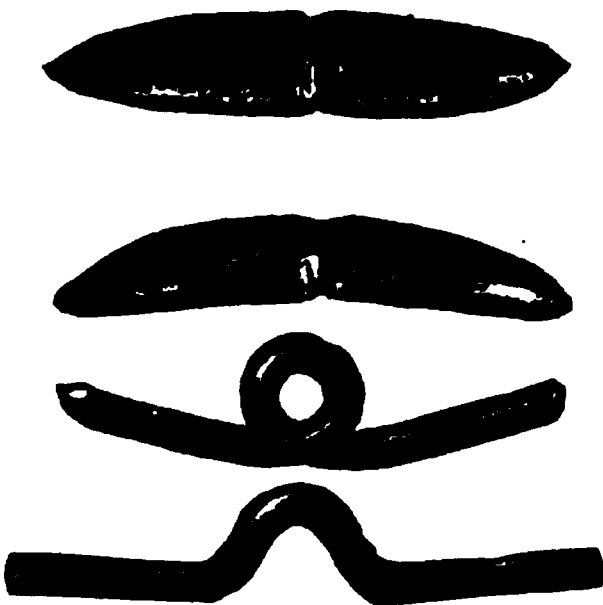


Fig. 32.—Ancient Bronze and Stone Gorges.

called gorges (see Fig. 32), pieces of pointed stone about an inch long, and having a groove in the middle

34). The Indians of California used hooks made of shell (Fig. 35). On the coast of France hooks are sometimes made of thorns, and the Piute Indians use the spine of a cactus. The Bible shows us that the use of hook and line was known, very early, to the Jews. The question in the book of Job, "Canst thou draw out Leviathan with a hook?" is supposed to refer to it. The prophet Isaiah says, "The fishers also shall mourn, and all they that cast angle in the brooks." Among the ancient Greeks and Romans angling was much practiced, and Antony and Cleopatra and the Emperor Trajan were fond of it. The sport has always been a favorite with many great men, among them Lord Nelson, Sir Walter Scott, and Sir Humphrey

Davy. More than a thousand books on angling have been written in



Fig. 34.—Ancient Double and Single Bronze Hooks.

English alone, the first of which, by Juliana Berners, was published in

Walton, a noted angler, which first appeared in 1653 and has been republished many times. The fifth edition (1676) was accompanied by a second part, giving instructions for fly fishing, by his adopted son Charles Cotton, and the two are now always printed together.

FISH POND. See ANGLING.

FIVES. See RACKETS.

FLAT-BOATING. Broad, flat-bottomed boats, called flatboats, bearing a wooden cabin, are used on shallow rivers and inlets by sportsmen. A flatboat is easily built by any one with a taste for carpentry. The hull should be about 14 feet long, 6 feet wide, and 18 inches deep, of two-inch pine planks, with a bottom of half-inch boards nailed on lengthwise. The whole should be calked with oakum and painted with coal-tar. The cabin is a framework covered with thin plank, and is about five feet high, and six feet square. In front of the cabin two oar-locks are fastened, which may be made of notched boards, and near the bow a small mast is set up. Another oar-lock, for the steering oar, is placed at the stern. The boat is propelled by rowing, and sometimes also by a square sail. It is slow, but its object is simply to furnish shelter to the sportsman, and enable him to move about from place to place in search of fish or game. It can float in water too shallow for a rowboat. A simpler kind of flatboat, which has been named a Crusoe-raft, is a raft of logs, joined together by cross strips, fastened by wooden pegs driven through auger holes. On the raft is a sort of tent made of bent saplings, covered with cloth, like the top of an old-fashioned emigrant wagon. For oars, long poles, with flat boards at the ends, may be used, and the tent should be floored with hay or straw. Such a raft may be built in the woods, floated down a river, and then abandoned, the boating party returning by rail. A flat-

Fig. 35.—Shell Hook.

1496. One of the most celebrated is "The Compleat Angler," by Isaac

boat journey is a kind of **CAMPING OUT** on the water and the outfit should be much the same as for a camp on land. An oven of stones may be built on the boat, so that cooking may be done on board.

FLOUR, an Explosion with. Any fine flour can be used in this experiment, but the best is ordinary corn starch. Nail together two boards, each about eighteen inches square, in the shape of a V, so that they make an angle of about 60 degrees. Lay the V on its side and at the top of the angle, fasten a candle by a wire, so that it projects into the space within the boards about an inch. Place within the V about a handful of corn starch, and, having lighted the candle, blow the starch toward the angle vigorously with an ordinary bellows. A dense cloud of flour will rise at the angle, and as it passes the candle it will take fire with a sudden puff, making a mass of flame. If the cloud does not catch fire at first it is probably because it is not thick enough. This can be remedied by using more corn starch, or blowing it more vigorously.

To blow the side out of a box with an explosion of this kind, remove one side of a wooden box about eight or ten inches square, and replace it with thick brown wrapping paper, gummed on tightly. Bore a hole in one of the lower corners to admit the bellows nozzle, and another in the top for ventilation. Put in a handful of corn starch through the hole in the top, and lower a lighted candle through the same hole with a wire, bending the wire so that the candle will hang within the box. Blow with the bellows through the lower hole, and after a few trials an explosion can be produced which will blow out the paper side of the box.

The reason why flour explodes thus, when it is in the form of a cloud, is that then each particle is surrounded by oxygen enough to burn it (see **FIRE**, in C. C. T.), and yet the particles are near enough for

the fire to pass from one to the other so that they flame up all at once.

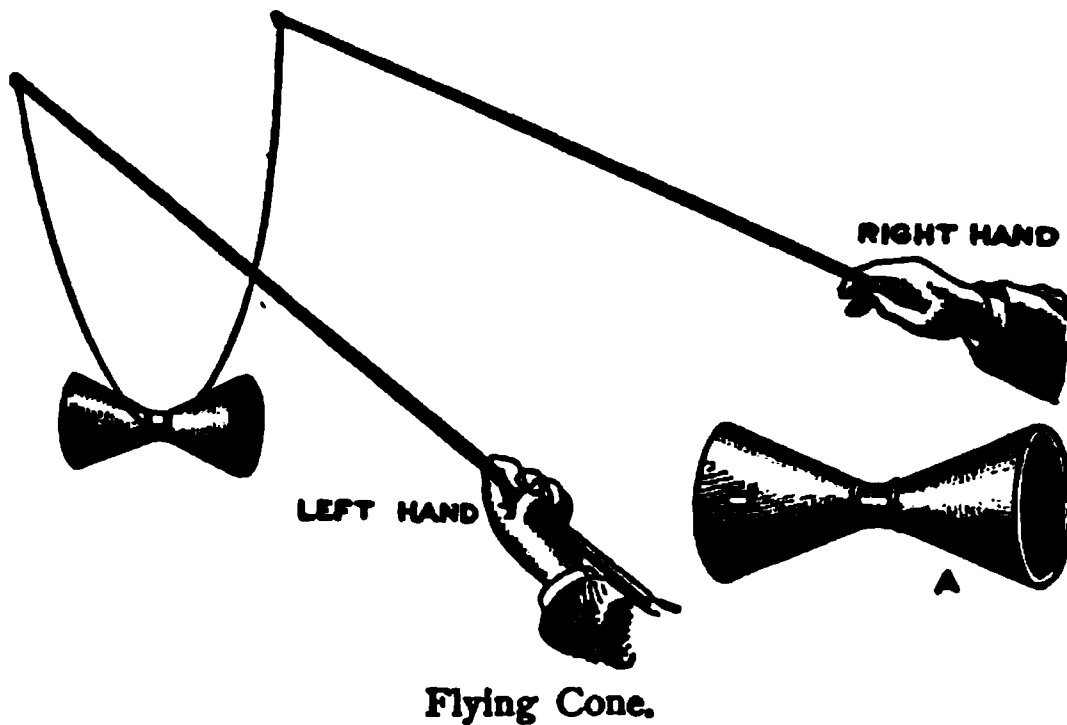
FLOWERS, Changes of Color in. Pour some common ether into a wine-glass, and to it add about one-tenth its bulk of strong ammonia water. This mixture has the property of changing the colors of many flowers when they are dipped into it. Some whose colors are red or violet, such as the red geranium, the violet, the periwinkle, the lilac, the rose, and the heliotrope, are turned bright green. The upper petal of the violet sweet pea becomes dark blue and the lower petal green. The streaked carnation becomes brown and bright green. White flowers generally turn yellow or orange, but yellow ones are not changed. The action of the liquid is so quick that flowers can be spotted simply by sprinkling it over them. Similar changes can be produced by using ammonia alone, though not so quickly. The ammonia may be poured on a glass plate and covered with an inverted dish, containing the flowers. Asters acquire an aromatic odor when thus treated. The colors of flowers which have been turned green in either of these ways may be somewhat restored by placing them in a vessel over hydrochloric acid. (See also **SULPHUR**.)

FLUORESCENCE, Experiments on. See **QUININE**.

FLY AWAY, a game played by any number of persons, with marbles, and an upright frame, seven inches high, on which are hung five small weights by elastic cords. The cords are kept stretched by fastening the weights to a cross bar near the ground, but, if one of the weights is struck by a rolling marble, it is unfastened and the elastic pulls it up quickly, so that it seems to fly away. The players take turns in rolling one or more marbles at the frame, and when a weight is struck the player scores whatever number is written above it. In another form, the weights are replaced by little boards

which, on being struck with the marbles, turn over, showing a comical picture on the other side.

FLYING CONE, or Devil on Two Sticks, a toy consisting of two cones joined at their points (see A, in illustration), and made to spin in the air



by means of a string a yard long, fastened by two sticks, each about two feet long. The toy is first laid on a table with the string under it, the player holding one of the sticks in each hand. The cone being near the right-hand stick, the player lifts that steadily so as to make the cone revolve. By tossing it up a little way the string can be brought back to the same point, and by repeating the process the cone is made to spin very rapidly. The skillful player can then toss it high into the air, and catching it, make it dance on the tightened string, cause it to roll up one of the sticks to his arm, and perform many other feats.

History. This toy had its origin in China, where peddlers use it to announce their approach by its humming. The Chinese form is much larger than ours, and consists of two cylinders of metal or bamboo united by a thin stem. The string makes a running knot around the stem, and no sticks are used in spinning it. On its introduction into Europe, early in this century, it assumed its

present form. In France, where it is called *Le diable* (The Devil), it was at one time so popular that, says a French writer, the toys "were made of the most valuable woods and even of glass. They were played with in parlors and on roofs, in public places and promenades; the sport was not confined to children, but ladies and even persons of eminence strove to excel in it, often to the great risk of the glass and porcelain in parlors, and often, too, with danger to the heads of the passers by, when the Devil was sent from afar by an inexperienced player."

The English scientist, Maxwell, a professor in the University of Cambridge, devoted much time to studying the movements of the Double Cone in the air, and succeeded in completely explaining it mathematically.

FLYING TOP. See TOPS.

FLY THE QARTER. See LEAP FROG.

FOLLOW MY LEADER, a game played by any number of persons, one of whom is chosen as leader, while the others follow him and do whatever he does. The players form in line behind the leader, who generally begins the same by doing some simple thing like leaping, hopping, or shouting. If any of the players fail to perform any of the leader's feats, that player must fall behind all those who were able to do so. The game may be made exciting by a good leader, but he should be careful not to lead his followers into danger.

FOOT AND A HALF. See LEAP FROG.

FOOT BALL, a game played by 22 persons, 11 on each side, with a

large .oval ball, usually of inflated rubber with a leather cover, on a field 330 feet long and 160 feet wide.

At each end is a goal made of two posts 18½ feet apart, with a crossbar 10 feet from the ground. The

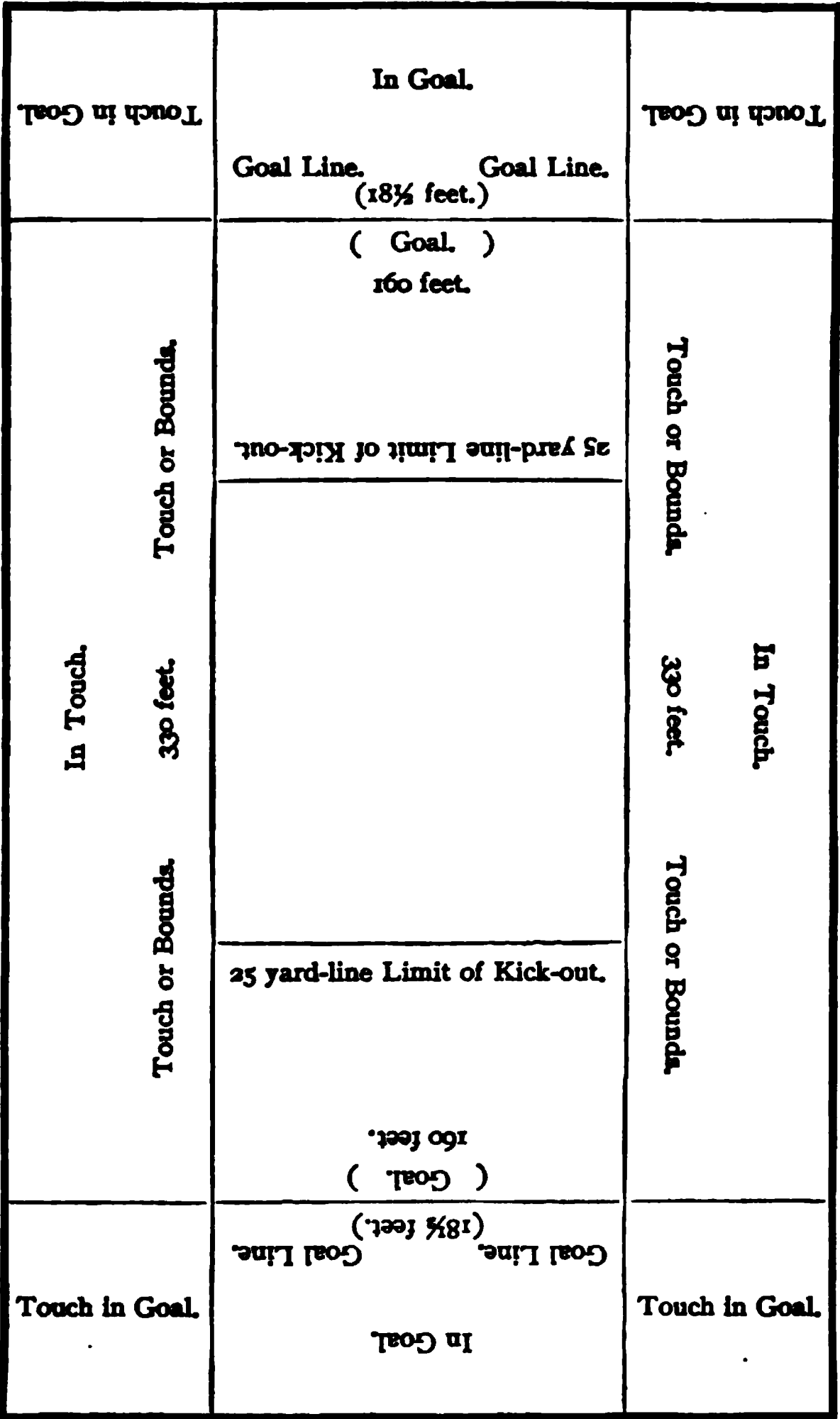


Diagram of Field.

posts project several feet above the crossbar. The end boundaries of the field are called goal lines. The

space beyond these lines, on either end and between the extended side lines, is called a Goal. The space

outside the side lines and between the extended goal lines is called Touch, and the space at the corners of the field, between the extended goal and side lines, is called Touch-in-Goal, as shown in the figure. Usually the field is marked also with cross-lines every five yards, to aid the referee in determining how far the ball has advanced. These lines give the foot-ball field the look that has led to its popular name of "the gridiron." Two of them, the fifth from each goal respectively, are called the "25-yard lines." All the lines are marked with lime. Each party or "team" consists of eleven persons, namely, seven Rushers or Forwards, a Quarter Back, two Half Backs, and one Full Back or Goal Tend. The opposing players face each other, and each side tries to carry or kick the ball toward the opposite goal, and either to touch the ball to the ground behind the goal (called "making a Touch-down") or to kick it over the cross-bar between the goal posts (called "kicking a Goal"). In general, the Rushers try to carry the ball forward and also to protect the Half Backs and Full Back, who do all the kicking.

The Center Rusher or "Snapper-back," should be a large, powerful man, but it is not necessary that he should run fast. His neighbors on either side are called "Guards," those next to these the "Tacklers," and the farthest ones the "End Rushers," who must be good general players and fine runners. The Quarter Back's position is the most responsible on the field, as it rests with him to determine the direction of the playing, and at critical moments he may even change the captain's policy. When the ball is held by the enemy the Quarter Back plays as a Rusher or Half Back. The best players in this position have usually been rather small men. The Half Backs should possess coolness and pluck, and must run, kick, and

tackle well. The Full Back must be a long kicker and fine tackler, so that it will be almost impossible for a hostile man to pass him. The captains usually direct the play of their men by secret signals previously agreed upon.

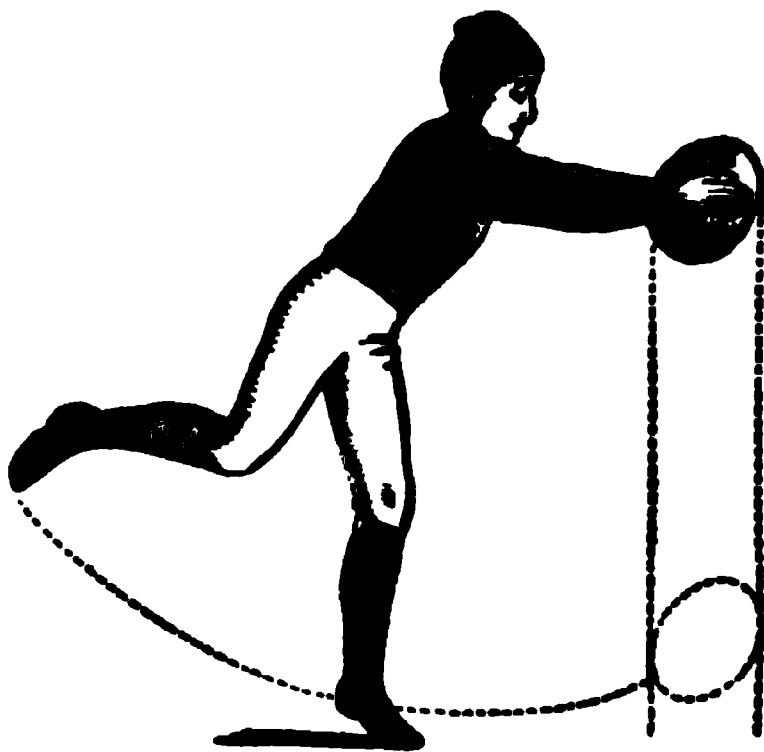
The leaders of the sides toss up before the game, and the winner takes either the "kick-off" or the choice of goals.

The players on each side now stand with their backs toward their own goal—the seven Rushers in a line, the Quarter Back just behind, then the Half Backs a few yards away, and finally the Full Back a dozen yards or so to the rear. The side having the "kick-off" places the ball in the center of the field, and one of that side kicks it toward the opposite goal. As soon as it is kicked it is said to be "in play." Before that, all on the kicking-off side stand behind the kicker, and all on the opposite side must stand at least 10 yards before the ball. The player who next gets possession of the ball has the choice of kicking it, of running with it, or of throwing it to some other player on his own side, but he must throw it sideways or back, never straight or diagonally forward. If he run with it, the opposed players may try to stop him by seizing or "tackling" him anywhere above the knees. He may try to keep them off by pushing with his open hand, but not with his closed fist. It requires skill as well as strength to stop a good runner. Sometimes four or five men will be unable to hold him, while at others a small player will stop a large one almost instantly. If he be tackled, and the ball fairly held, he must say "Down," and a player on his side, usually the Snapper-back, then puts the ball on the ground for a "scrimmage." The opposing rushers form in two lines, facing each other, each on their own side of the place where the ball was down. The Snapper-back takes the ball and "snaps" it

(see note under Rule 6) back to the Quarter Back, who passes it to another player on his own side. That player may then try to carry it through the opposing rush line or kick it, but if in three successive "downs" by the same side the ball is not advanced 5 yards, or taken back 20 yards, it must then be kicked, or surrendered to the opponents on the next failure to advance. When a ball is kicked, anyone on the opposite side who catches it fairly, without stepping from his place, at the same time making a mark with his heel on the ground, may have a "free kick." The opponents may then come up to that mark, but must not pass it till, after retiring as far as he wishes, the one who made the catch kicks it. He may take a "drop-kick," or a "punt," or hold the ball for a "place-kick" (all of which are described in Rule 2, below), but if he takes a place-kick the opponents may advance, or "charge," as soon as the ball touches the ground. When in the course of the game a player succeeds in getting the ball near enough to his opponents' goal, he may try to kick a goal, which he may do in any way except by a punt, or he may touch the ball down in Goal, which is called making a Touchdown. His side must then make a "Try at Goal," either by a place-kick or a punt-out as described in Rules 24 and 25. When a side has the ball, but is hard pressed, near its own goal, it may gain a temporary advantage by taking the ball back across the goal line and making a Safety touchdown, or "Safety," as described in Rule 4 (d). The ball can then be carried straight out, not more than 25 yards from the goal line, and kicked. Till it is so kicked the opposing side must not come nearer the goal line than 25 yards. A "Safety" counts against the side making it, but if the ball is kicked or carried across the goal line by one of the opposite side and then

comes into possession of the owners of the goal, who touch it down, it is called a Touchback, and does not count against them. If the ball crosses the side lines, or "goes in touch," it is put in play again, as described in Rule 22.

During the game every player is either "off-side" or "on-side" and only those "on-side" can take active part in the game. Rule 10 tells when a player is off-side and how he is put on-side again. The ball must be either "in play" or "dead," and while it is "dead" no play may



Drop Kick.

be made. For instance, when a Safety has been made, the ball is dead till it is put in play, according to rule, by a kick-out. Till it is so put in play, the player holding it may not run with it, kick it, nor throw it, and the opposing players must make no effort to get possession of it. Rule 11 gives all the cases where a ball is dead. All disputed points during a match game are decided by a referee, an umpire, and a linesman, as described in Rule 29. In a practice game one person often does duty for all three.

A game consists of two halves, each 35 minutes long, with a ten-minute intermission; and the side scoring the greatest number of

points wins. The points are determined by the Goals, Touchdowns, and Safeties as explained in Rule 26. The details of the game will be better understood by studying the rules given below.

The balls used for playing are of various kinds. The Rugby, once used in all foot-ball games in this country, is oval, and consists of an India-rubber bladder with a leather case. The English Association ball has also a bladder and case, but is

Foot Balls.

round. These different kinds of ball are made in various sizes, from 20 to 33 inches in circumference. Foot-ball players now usually wear canvas jackets lacing in front, and trousers of fustian or some other stout material, padded over the knees and thighs. Long woolen stockings are worn, and sometimes the Forwards use shin-guards. Shoes are of leather or canvas, with leather-strips or spikes on the sole. The Quarter Back, Center Rush, and Full Back often wear simply knit jerseys.

Foot-ball Rules. Substantially as adopted in 1898 by the University Athletic Club: *

EQUIPMENT, OFFICIALS, ETC.

RULE 1.—(a) The game shall be played upon a rectangular field, of dimensions described in the preceding article.

(b) The game shall be played by two teams of eleven men each.

(c) The officials shall be a referee, an umpire, and a linesman.

(d) The foot ball used shall be of leather, enclosing an inflated rubber

bladder. The ball shall have the shape of a prolate spheroid.

DEFINITION OF TERMS.

RULE 2.—(a) A *Drop-Kick* is made by letting the ball drop from the hands and kicking it the instant it rises from the ground.

(b) A *Place-Kick* is made by kicking the ball after it has been placed on the ground.

(c) A *Punt* is made by letting the ball drop from the hands and kicking it before it touches the ground.

(d) A *Kick-Off* is a place-kick from the center of the field of play, and cannot score a goal. (Rule 8.)

(e) A *Kick-Out* is a drop-kick, place-kick, or punt made by a player of the side which has made a safety or a touchback.

(f) A *Free Kick* is a term used to designate any kick when the opponents are restrained by rule from advancing beyond a certain point.

RULE 3.—(a) The ball is *Out of Bounds* when it or any part of the player who holds the ball touches the ground on or outside the side line or side line extended.

(b) If the ball is kicked so that it goes out of bounds before crossing the opponents' goal line, it shall belong to the opponents. If, however, it strikes any player who is on-side, and then goes out of bounds, it shall belong to the player who first obtains possession of it.

RULE 4.—(a) A *Touchdown* is made when the ball in possession of a player is declared dead by the Referee, any part of it being on, over, or behind the opponents' goal line.

(b) The point where the touchdown is marked, however, is not where the ball is carried across the line, but where the ball is fairly held or called "down."

(c) A *Touchback* is made when the ball in possession of a player guarding his own goal is declared dead by the Referee, any part of it being on, over, or behind the goal line, provided the impetus which

* In the same year associations of Western and Southern colleges adopted rules of their own which differ slightly from these.

sent it to or across the line was given by an opponent.

(*d*) A *Safety* is made when the ball in the possession of a player guarding his own goal is declared dead by the Referee, any part of it being on, over, or behind the goal line, provided the impetus which caused it to pass from outside the goal to or behind the goal line was given by the defending side.

RULE 5.—A *Punt-Out* is a punt made by a player of the side which has made a touchdown to another of his own side for a fair catch.

RULE 6.—(*a*) A *Scrimmage* takes place when the holder of the ball places it upon the ground and puts it in play by kicking it forward or snapping* it back.

(*b*) If, after the snapper-back has taken his position, he should voluntarily move the ball as if to snap it, the scrimmage has begun.

(*c*) When snapping the ball back, the player so doing must be on-side, the hand or foot used in snapping the ball excepted. (Rule 10.)

RULE 7.—(*a*) A *Fair Catch* consists in catching the ball after it has been kicked by one of the opponents and before it touches the ground, or in similarly catching a punt-out by another of the catcher's own side, provided the player, while making the catch, makes a mark with his heel. It is not a fair catch if the ball, after the kick, was touched by another of his side before the catch. Opponents who are off-side shall not interfere in any way with a player attempting to make a fair catch, nor shall he be thrown to the ground after such catch is made unless he has advanced beyond his mark.

(*b*) If a side obtains a fair catch, the ball must be put in play by a punt, drop-kick, or place-kick, and the opponents cannot come within ten yards of the line on which the fair catch was made; the ball must

be kicked from some point directly behind the spot where the catch was made, on a line parallel to the side line.

RULE 8.—A *Goal* is made by kicking the ball in any way, except by a punt, from the field of play over the crossbar directly over one of the uprights of the opponents' goal.

RULE 9.—*Charging* is rushing forward to seize or block the ball or to tackle a player.

RULE 10.—(*a*) In a scrimmage no part of any player shall be ahead of the ball when it is put in play. (Exception under Rule 6, *c*.)

(*b*) A player is put off-side if the ball in play has last been touched by one of his own side behind him. No player, when off-side, shall touch the ball except on a fumble or a muff, nor shall he interrupt or obstruct an opponent with his hands or arms until again on-side. No player can, however, be called off-side behind his own goal line.

(*c*) A player being off-side is put on-side when the ball has touched an opponent, or when one of his own side has run in front of him, either with the ball, or having been the last player to touch it when behind him.

(*d*) If the ball, when not in possession of either side, is touched when inside the opponents' ten-yard line by a player who is off-side, it shall go as a touchback to the defenders of that goal.

RULE 11.—The ball is *Dead*:

(*a*) Whenever the Referee or Umpire blows his whistle or declares a down.

(*b*) When the Referee has declared that a down, touchdown, touchback, safety, or goal has been made.

(*c*) When a fair catch has been heeled.

(*d*) When it has been downed after going out of bounds.

RULE 12.—(*a*) The length of the game shall be 70 minutes, divided into two halves of 35 minutes each, exclusive of time taken out. There

* Snapping the ball means putting it back by hand or foot with one quick and continuous motion from its position on the ground.

shall be ten minutes' intermission between the two halves.

(b) The game shall be decided by the score at the end of the two halves.

(c) Time shall not be called for the end of a half until the ball is dead, and in case of a touchdown, the try-at-goal shall be allowed.

(d) Time shall be taken out whenever the game is unnecessarily delayed or while the ball is being brought out for a try-at-goal, kick-out, or kick-off, or when play is for any reason suspended by the Referee or Umpire. Time shall begin again when the ball is actually put in play.

(e) No delay shall continue more than two minutes.

RULE 13.—(a) The captains shall "toss up" before the beginning of the game, and the winner of the toss shall have his choice of goal or kick-off. The ball shall be kicked off at the beginning of each half. Whenever a goal, following a touchdown, has been tried or a goal from the field has been kicked, the side defending that goal shall kick off. The teams shall change goals at the beginning of the second half. The same side shall not kick off at the beginning of two successive halves.

(b) At kick-off, if the ball goes out of bounds before it is touched by an opponent, it shall be brought back and kicked off again. If it is kicked out of bounds a second time it shall go as a kick-off to the opponents. If either side thus forfeits the ball twice, it shall go to the opponents, who shall put it in play by a scrimmage at the center of the field.

(c) At kick-off, if the ball is kicked across the goal line and is there declared dead when in the possession of one of the defending side, it is a touchback. If it is declared dead thus in possession of the attacking side, it is a touchdown.

(d) At kick-off and on a kick from a fair catch, the opposite side must stand at least ten yards in front of the ball until it is kicked. On a

kick-out, the opposite side cannot stand nearer the goal than the 25-yard line, except on a kick-out made after a drop-kick upon the first down inside the 25-yard line, when the 15-yard line is the restraining mark. (See Rule 23, exception.)

RULE 14.—(a) The side which has a free kick must be behind the ball when it is kicked.

(b) In the case of a kick-off, kick-out, or kick from a fair catch, the ball must be kicked a distance of at least ten yards towards the opponents' goal from the line restraining the player making the kick, unless it is stopped by an opponent; otherwise the ball is not in play.

RULE 15.—(a) Charging is lawful, in case of a punt-out or kick-off, as soon as the ball is kicked; and the opponents must not charge until the ball is kicked.

(b) In case of any other free kick, charging is lawful: (1) When the player of the side having the free kick advances beyond his restraining line or mark with the ball in his possession; (2) When he has allowed the ball to touch the ground by accident or otherwise.

(c) If such lawful charging takes place, and if the side having the free kick fails to kick the ball, then the opponents may line up five yards ahead of the line which restrained them before charging. In that case, the side having the free kick must kick the ball from some point directly behind its mark, if the free kick resulted from a fair catch, and in other cases from behind the new restraining line.

RULE 16.—(a) The snapper-back is entitled to full and undisturbed possession of the ball. The opponents must neither interfere with the snapper-back nor touch the ball until it is actually put in play.

(b) In snapping the ball back, if the player so doing is off-side, the ball must be snapped again, and if this occurs again on the same down the ball goes to the opponents.

(c) The man who snaps back and the man opposite him in the scrimmage cannot afterward touch the ball until it has touched some player other than these two.

(d) If the man who puts the ball in play in a scrimmage kicks it forward, no player of his side can touch it until it has gone ten yards into the opponents' territory, unless it be touched by an opponent.

(e) The man who first receives the ball when it is snapped back shall not carry the ball forward beyond the line of scrimmage unless he has regained it after it has been passed to and has touched another player.

RULE 17.—(a) Before the ball is put in play no player shall lay his hands upon, or by the use of his hands or arms interfere with, an opponent in such a way as to delay putting the ball in play.

(b) After the ball is put in play, the players of the side that has the ball may obstruct the opponents with the body only, except the player running with the ball, who may use his hands and arms.

(c) The players of the side not having the ball may use their hands and arms, but only to get their opponents out of the way in order to reach the ball or stop the player carrying it.

RULE 18.—(a) Before the ball is put in play in a scrimmage, if any player of the side which has the ball takes more than one step in any direction, he must come to a full stop before the ball is put in play.

When the ball is put in play by a scrimmage:

(b) At least five players of the side having the ball must be on the line of scrimmage.

(c) If five players, not including the quarter back, are behind the line of scrimmage and inside of the positions occupied by the players at the ends of said line, then two of these players must be at least five yards back of this line, but all of these players may be nearer than five yards to the line of scrimmage if

two of them are outside the positions occupied by the players at the ends of said line.

RULE 19.—A player may throw, pass, or bat the ball in any direction except toward his opponents' goal.

RULE 20.—(a) If a player having the ball is tackled, and the movement of the ball stopped, or if the player cries "down," the Referee shall blow his whistle, and the side holding the ball shall put it down for a scrimmage.

(b) As soon as a runner attempting to go through is tackled and goes down, being held by an opponent, or whenever a runner having the ball in his possession cries "Down," or if he goes out of bounds, the Referee shall blow his whistle, and the ball shall be considered down at that spot.

(c) There shall be no piling up on the player after the Referee has declared the ball dead.

RULE 21.—(a) If, in three consecutive downs (unless the ball crosses the goal line), a team has neither advanced the ball five yards nor taken it back twenty yards, it shall go to the opponents on the spot of the fourth down.

(b) When a distance penalty is given, the ensuing down shall be counted the first down.

RULE 22.—If the ball goes out of bounds, whether it bounds back or not, a player of the side which secures it must bring it to the spot where the line was crossed, and there either

(a) Touch it in with both hands at right angles to the side line and then kick it; or

(b) Walk out with it at right angles to the side line, any distance not less than five nor more than fifteen yards, and there put it down for a scrimmage, first declaring how far he intends walking.

RULE 23.—A side which has made a touchback or a safety must kick out, from not more than twenty-five yards outside the kicker's goal.

If the ball goes out of bounds before striking a player, it must be kicked out again, and if this occurs twice in succession, it shall be given to the opponents as out of bounds on the twenty-five-yard line on the side where it went out. At kick-out, the opponents must be on the twenty-five-yard line or nearer their own goal, and the kicker's side must be behind the ball when it is kicked. Should a second touchback occur before four downs have been played, the side defending the goal may have the choice of a down at the twenty-five-yard line, or a kick-out.

RULE 24.—(a) A side which has made a touchdown must try at goal, either by a place-kick or a punt-out.

(b) After the try-at-goal, whether the goal be made or missed, the ball shall go as a kick-off at the center of the field to the defenders.

RULE 25.—(a) If the try be by a place-kick, a player of the side which has made the touchdown shall hold the ball for another of his side to kick at some point outside the goal on a line parallel to the side line passing through the point where the touchdown was declared. The opponents must remain behind their goal line until the ball has been placed upon the ground.

(b) If the try-at-goal is to be preceded by a punt-out, the punter shall kick the ball from the point at which the line parallel to the side line, and passing through the spot of the touchdown, intersects the goal line. The players of his side must stand in the field of play not less than five yards from the goal line.

(c) The opponents may line up anywhere on the goal line except within the space of ten feet on each side of the punter's mark, but they cannot interfere with the punter. If a fair catch be made from a punt-out, the mark shall serve to determine the positions as the mark of any fair catch, and the try-at-goal shall then be made by a place-kick from this spot, or any point directly

behind it. If a fair catch be not made on the first attempt, the ball shall go as a kick-off at the center of the field to the defenders.

(d) The holder of the ball in any place-kick may be off-side or out of bounds without vitiating the kick.

RULE 26.—The following shall be the values of plays in scoring: Goal obtained by touchdown, 6 points; goal from field kick, 5 points; touchdown failing goal, 5 points; safety by opponents, 2 points.

RULE 27.—(a) No one having projecting nails or iron plates on his shoes, or wearing upon his person any metallic or hard substance that in the judgment of the Umpire is liable to injure another player, shall be allowed to play in a match. No sticky or greasy substance shall be used on the persons of the players.

(b) A player may be substituted for another at any time at the discretion of the captain of his team, and the player who has been replaced cannot return to the game.

(c) There shall be no tripping or tackling below the knees.

PENALTIES.

RULE 28.—A foul is any violation of a rule. [The latest rules prescribe minutely the penalties for each kind of foul. In general, when the offending side has the ball, it is punished by being made to surrender it to the other side; if not, the ball is advanced from 5 to 15 yards.]

DUTIES OF OFFICIALS.

I.—The Referee.

RULE 29.—The Referee is responsible for the enforcement of Rules 1, 2, 3, 4, 5, 6 (a and b); 7 (except as relates to interference, throwing catcher, and positions of players); 8, 11, 12, 13 (except d); 14, b; 16, e; 19, 20 (a and b); 21, 22, 23 (except as relates to positions of players); 24, 25 (except as relates to positions of players and interference); 26.

In making his decisions the Referee must recognize and allow precedence to any penalty inflicted by the Umpire for a foul.

The Referee's decisions are final upon all points not specified in the duties of the Umpire.

The Referee shall see that the ball is properly put in play, and he is judge of its position and progress.

At the beginning of a game and after time has been taken out, he shall ascertain from each captain that his team is ready, before ordering play.

He is sole authority for the score of the game and is judge of forfeiture of the game under the rules.

The Referee may appeal to the Umpire and Linesman for testimony.

II.—The Umpire.

The Umpire is responsible for the enforcement of all rules whose infringement is punishable by a distance penalty or by the surrender of the ball to the opponents, except 13, *b*; 16, *e*; 19, and 23, viz.: Rules 6, *c*; 9, 10, 13 *d*; 14 *a*; 15, 16, (except *e*); 17, 18, 20 *c*; 27.

The Umpire is judge of the conduct of the players, and his decision is final regarding such fouls as are not specifically placed within the jurisdiction of the Referee.

The Umpire is judge of charging, and of the positions of players whenever the ball is put in play.

He may appeal to both the Referee and Linesman for testimony in cases of fouls seen by them.

The Umpire shall not blow his whistle nor declare the ball dead, nor call time, except to grant a penalty for a foul committed.

III.—The Linesman.

The Linesman shall, under the supervision of the Referee, mark the distances gained or lost in the progress of the play.

He shall be provided with two assistants, who shall remain outside the field of play and who shall use, in measuring distance, a rope or chain.

The Linesman shall, under the direction of the Referee, also keep the time and shall notify the captains of the time remaining for play, not more than ten nor less than five minutes before the end of each half.

History. Foot ball was a favorite game in ancient Greece and Rome. The game comes to us from England, where it has been played for centuries. It was customary at one time for the different villages in the Midland counties to play against each other, and desperate struggles often took place which sometimes grew into riots and produced long and bitter feuds. Foot ball was early played at the great English schools, and at each of them new features were introduced, till several forms of the game were developed. About 1860, foot-ball clubs began to be formed near the large cities, and on May 8, 1866, these clubs sent delegates to a convention, and adopted rules, excluding features of the school games that were considered too rough. Foot ball, as thus played, did not become popular in this country till about ten years after the adoption of these rules. In 1875 Harvard and Yale played their first game of foot ball with Rugby rules, and soon afterwards the game became a favorite at other colleges. The game just mentioned was played with eleven men on a side, and this is the number that the present college rules allow, though in the years 1878 and 1879 it was played with fifteen on a side. The game is played in this country from about the 1st of October till the end of November. The last official foot-ball guide contains records of 77 school and college teams and of 6 others, chiefly from athletic clubs. To play foot ball well requires strength, skill, and courage, and an English general once attributed much of the pluck of the English troops to their experience of the game. It is very rough, and often results in injury to the players, but the roughness is now restrained, by strict rules, within reasonable limits, and a slight degree of danger adds to the fascination of the game for most persons. There are no professionals, or paid foot-ball

clubs, and the game is seldom played by men more than twenty-five years old.

FORFEITS, a game played by any number of persons, in which articles given up by each of them are restored on the performance of some difficult or ridiculous feat. Usually the forfeits have been paid in a previous game, as punishment for breaking some rule. One of the players, who has been selected as judge, sits in a chair, while another, who must know to whom the forfeits belong, holds them over the judge's head one by one, saying: "Heavy, heavy, what hangs over your head?" The judge then asks, "Fine or Superfine?" to which the other answers "Fine," if the owner of the forfeit is a boy, or, "Superfine," if a girl, adding, "What shall the owner do to redeem it?" The judge then tells what the owner must do to get back his property. Sometimes instead of the first question the following is used: "Here is a forfeit, a very fine forfeit. What shall be done to redeem it?" A few of the most common tasks are given below.

Forfeits for either boys or girls:

1. Blow out a candle as it is passed rapidly back and forth before the mouth.

2. Place a candle at one end of the room, and then walk toward it blindfold from the other, and blow it out.

3. Laugh in one corner of the room, sing in another, cry in the third, and whistle in the fourth.

4. Bow to the prettiest person in the room, kneel to the wittiest, and kiss the one you love best.

5. Count any required number backward.

6. Pay a compliment to each person in the room.

7. Hop around the room on one foot.

8. Kiss your shadow.

9. Answer "No" to a question from each one of the company.

10. Answer five questions without saying "yes" or "no."

11. Make a courtesy to each girl in the room, and a bow to each boy.

12. Make a speech on any subject assigned by the judge.

13. Repeat a sentence after the judge without making a mistake.

Forfeits for boys only:

1. Crawl under the table on all fours and bark like a dog.

2. Stand on your head, or try to do so, in the middle of the room.

3. Hold one foot in your hand, and hop on the other around the room.

4. Join your hands and jump through your arms.

5. Sit on the floor and rise without the aid of your hands.

5. Pick three coins from the floor with your teeth.

7. Jump up and catch in your teeth a piece of paper pinned on the wall just above your head. (Sometimes called "browsing.")

8. Kiss the sole of each shoe.

9. Balance a ruler on your chin or nose.

Forfeits for two persons:

1. Each holds a lighted candle, and they pass and repass each other, while they hold the following dialogue, without smiling:

"The King of Morocco is dead."

"Sad news! Sad news!"

"Alas!"

"Alas!"

2. Two or more boys are "trussed" (see TRUSSING GAME) and placed in a row. The end boy is pushed over, and they all go down like a row of building blocks.

3. Hop on one foot from one end of the room to the other, and back. He who does this in the quickest time redeems his forfeit; the other's is returned to the pile.

4. Two are blindfolded, and required to start from opposite corners of the room and shake hands.

FORTUNE-TELLING, a sport in which one person pretends to foretell what is going to happen to another. If this is done merely as a

game, it often furnishes much harmless amusement. Games of SOLITAIRE are often played as fortune-telling games, and others are described in the articles on HALLOWE'EN, and SPORTS WITH FLOWERS AND FRUIT.

A simple fortune-telling game is played with a disk of paper over which turns a pointer. The pointer may be cut out of wood, and fastened to the center of the disk with a pin, on which it can turn easily. The pin should be bent as in the cut so that the pointer will not rub against the paper. Around the edge of the disk are numbers in regular order, and on a separate piece of paper are written sentences predicting good or evil fortune. For instance:

"You will inherit a large sum of money."

"You will marry a widow 60 years old."

"You will move to California within a year."

Some of the sentences may also be warnings. For instance:

"Beware of a red-haired boy."

"Keep away from Twenty-third street."

Indeed, the sentences may be varied almost infinitely to suit the writer. They must be numbered in order to correspond with the numbers on the disk. The players, one by one, set the pointer in motion, and each, noting the number opposite which it stops, seeks his fortune in the sentence opposite the corresponding number. Sometimes the sentences are written directly on the disk, but it is not possible to have much variety in this way. A numbered disk can be used with various sets of sentences.

Fortune-telling with Cards. I. A method which, like the one above, requires no skill is to place face upward, in a row, four Kings, if the person whose fortune is told be a girl, or four Queens, if it be a boy.

The boy or girl gives to each card the name of an acquaintance, calling them after boys, if they are Kings, and girls, if Queens. The names are usually kept secret till the close of the game. The fortune-teller now takes the cards one by one as they come from the pack, and lays one beneath each of the four Kings or Queens, then four others on these, and so on. Whenever he deals an Ace or face card (called a "turning card") he turns the King or Queen above it a quarter-way around, so that when four turning cards have fallen on the pile below any King or Queen it will be turned completely around. When one has been thus turned quite around, the fortune-teller announces that the person whose name it bears is the "best friend" of the one whose fortune is told. He then continues, in the same way, till the other three complete their turns. The one whose fortune is being told is informed, in order, that these are:

The one whose best friend he is;

The one he loves best; and,

The one he is to marry.

Sometimes when one card has made a complete turn, the pack is gathered up, the Kings replaced, and the operation begun anew. Thus it may happen that the same card turns first twice, thrice, or even four times. The Kings or Queens must all be turned in the same direction, so that one which has turned a quarter-way around can be told from one three-quarters around. The best direction is that in which the hands of a watch move. Double-headed cards must of course be marked to distinguish one end from the other.

II. Another method, which requires quickness and skill in the fortune-teller, is to deal the cards slowly face upward on the table just as they come from the pack, and by attaching some meaning to each one to pretend to predict the future. This should be done as quickly as possible and

can be made very amusing. Each fortune-teller should decide on a system of his own; but some of the usual meanings attached to cards are as follows:

King or Queen—man or woman.

Knave—boy or villain.

Red face-cards—blondes.

Black face-cards—brunettes.

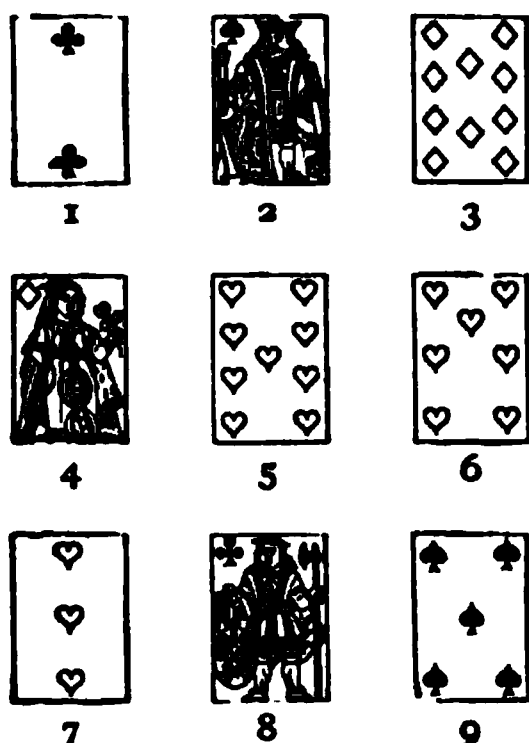
Diamonds—wealth.

Hearts—love.

Clubs—violence, war, or force.

Spades—hard work.

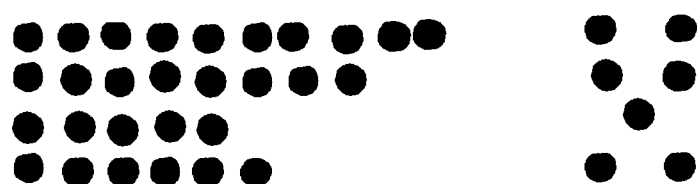
Thus, suppose the cards to fall as indicated below, the fortune-teller might talk somewhat in this way.



The words suggested by the cards are in italics. "You will have a *slight quarrel* (1) with a *dark man*, (2) and will have to spend a *great deal of money* (3) to get out of your trouble, but a *light woman* (4) will fall *deeply in love* (5) with you, and give you all you want. But her love will grow *less* (6) and *less* (7), until finally she will run off with a *dark haired villain* (8), and leave you to *work* for your living."

Fortune-Telling by Dots. The person whose fortune is to be told is directed to make four horizontal rows of pencil dots, without counting the number in each. The fortune-teller now counts them, and makes opposite each row a single spot if its number is odd, or two

spots, if even. Thus, if the rows of dots are as follows:



the fortune-teller would place his spots as shown at the right, forming a sort of figure. There are sixteen possible kinds of these figures and each is given a name, as shown below.

The usual method is for the inquirer to ask a question, which is answered by the fortune-teller in accordance with the figure resulting from the dots. The meaning of the figures is further explained below.

1. Gain: A distinguished suitor, riches, a wish fulfilled, a happy result, regaining lost property, many friends, new clothes, sickness cured, etc.

2. Loss: Extravagance, dancing, music, unfaithfulness, deceit, false friends, bitter enemies, thieves, etc.

3. Joy: A betrothal, a pleasant change, victory, advancement, and honor, etc.

4. Sorrow: Quarrels with friends, an unfortunate speculation, an anonymous letter, shipwreck, an accident, sickness, etc.

5. Union, or Harmony: Hopes fulfilled, the discovery of treasure, advancement, plots, conspiracy.

6. Captivity: Something caught or reached, an interrupted journey, buried goods, a mine, treacherous love, death, honor attained, etc.

7. White: Good fortune, a short life, a happy marriage, increase of wealth by silver, certainty.

8. Red: Wounds, death in a foreign land, bad fortune, fire.

9. The Public: Mingled good and bad luck, enemies and friends, much work, tears, and journeys.

10. The Road: also both good and bad. In case of right management all will turn out well, otherwise badly.

11. The Dragon's Head : A good sign, though what is wished for will meet many obstacles.

12. The Dragon's Tail : A bad sign, desolation, bereavement.

13. Great Luck : The full attainment of all wishes, wealth, honor, love, etc.

14. Little Luck : Good fortune,

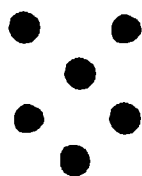
though not as great as the above, a moderate amount of success, etc.

15. The Maiden : Success in even a less degree than the last.

16. The Youth : Bad luck in a less degree than Number 12.

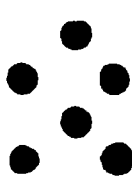
From what has been given above, the skillful fortune-teller will be able to return an elaborate answer to any

1



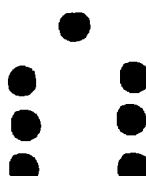
Gain.

2



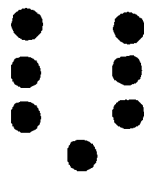
Loss.

3



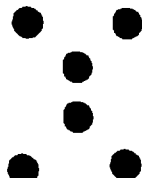
Joy.

4



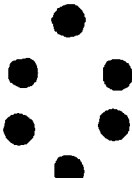
Sorrow.

5



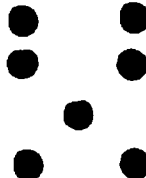
Union.

6



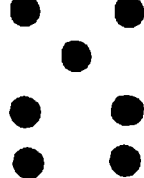
Captivity.

7



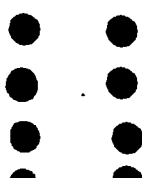
White.

8



Red.

9



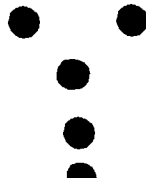
The Public.

10



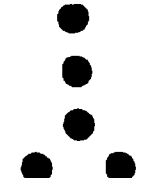
The Road.

11



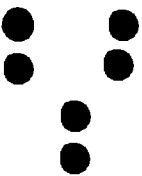
The Dragon's Head.

12



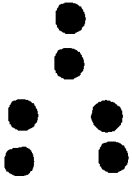
The Dragon's Tail.

13



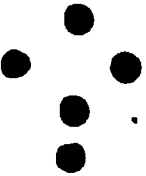
Great Luck.

14



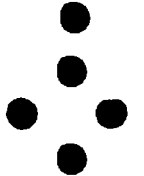
Little Luck.

15



The Maiden.

16



The Youth.

question. It is a good plan, especially if the result shows nothing but evil, to try again, and combine the two results in one prediction.

Palmistry, fortune telling by means of the palm of the hand. Different parts of the hand are called "mountains" and named after the seven planets known to the ancients, including the sun and moon. The lines on the palm also are given names. Both "moun-

tains" and lines are shown in the cut.

The mountains have different meanings according as they are high or low; the lines according as they are complete or broken, as shown in the following table :

THE LINE OF	COMPLETE.	BROKEN.
Life	Long Life	Short Life
The Liver	Health	Sickness
The Brain	Wisdom	Stupidity
The Table	Evil	Good

THE MOUNT OF	HIGH.	LOW.
Venus	Love	Hate
Jupiter	{ Honor and Rank	Humble condition
Saturn	Riches	Poverty
The Sun	{ Good fortune	Bad fortune
The Moon	{ Luck on a journey	Ill fortune on a journey
Mercury	Adroitness	Blundering
Mars - -	{ Bad fortune in war	Good fortune in war

History. In ancient times most people believed that certain persons could predict the future. Fortune-

fore undertaking any public enterprise. They pretended to tell fortunes by examining the bodies of slaughtered animals or fowls, by the flight of birds, by the appearance of the heavens, and by all sorts of signs and omens. In the Middle Ages the favorite method of fortune-telling was by Astrology (science of the stars, from Greek *aster*, star, and *logos*, a word), a pretended science by which events were foretold from the appearance and positions of the planets. The people called Gipsies often tell fortunes for money, generally by means of palmistry. With the increase of education belief in real fortune-telling has disappeared, though ignorant or foolish people are now and then deceived by some rogue, who pretends to be able to tell them about the future. Fortune-telling is now used by sensible people merely as a game. At fairs, a girl, dressed usually as a Gipsy, often tells fortunes for money, and, if she is clever, is sometimes very successful.

FOUNTAIN, To make a. In the side of an ordinary wooden pail, close to the bottom, bore an auger hole, and plug it with a cork or rubber stopper through which passes a glass tube about two inches long (see **CHEMICAL EXPERIMENTS**). Put the pail on a high shelf, and attach to the glass tube enough rubber tubing to reach to the nearest sink, or out of doors. At the end of the rubber tube fasten a glass jet. If the pail be filled with water and the rubber tube closed with a pinch-cock, the fountain will play when the cock is opened.

FOURTEEN, a **SOLITAIRE** game of **CARDS**, played with two full packs. Five rows of five cards each are first laid out at random to form a square. If in any row, either crosswise or up and down, there are two cards the sum of whose pips is 14, they must be taken out, and their places filled with the next two in the pack, in the same order in which the cards were first laid down. The Knave, Queen,

1. Mount of Venus. 2. Mount of Jupiter. 3. Mount of Saturn. 4. Mount of the Sun. 5. Mount of Mercury. 6. Mount of the Moon. 7. Mount of Mars.

A. Line of Life. B. Line of the Liver. C. Line of the Brain. D. Line of the Table.

telling was carried on regularly at the temples of some of the Greek gods, the most celebrated of which was that of Apollo at Delphi (see C. P. P.). The Roman fortune-tellers, called *haruspices*, were consulted be-

and King count respectively as 11, 12, and 13. If no cards can thus be removed, two may exchange places, but this cannot be done twice in succession and is allowed only before the pack has all been used. When the pack is exhausted, the lower row is taken up, shuffled, and used to fill the spaces in what remains of the square. Then the next row is treated in like manner. If this can be continued till all the cards are gone, the game is won.

FOURTH OF JULY, or Independence Day, the anniversary of the signing of the Declaration of Independence. It is a National holiday, and is made the occasion of many sports, chief among which, for boys, are the discharge of fire-crackers and fire-works.

Decoration. The colors for Fourth of July decorations are of course the National colors, red, white, and blue. Foremost among the decorations should be a large United States flag (C. C. T.), to be raised on a staff on or near the house. The flag has a piece of rope sewed along the edge next the Union, the ends of which project a little and are made into loops. When the flag is to be raised, the ends of the halliards are fastened to these loops, and the flag is then pulled to the top of the pole, when the halliards are fastened below around a cleat near the bottom. The illustrations show the process of raising (Fig. 1), and the appearance of the flag when raised (Fig. 2).

The proper time to raise the flag is at sunrise, when it should be given a national salute; as many guns as there are States in the Union. Fire-crackers, or even torpedoes, will do for this, if you have no cannon. Other flags, of all sizes, may be draped about a house in many ways. A rosette may be made of a flag by laying it flat on the floor (Fig. 3), pulling the middle of one edge down (Fig. 4), and then pinning together the halves of that edge (Fig. 5). The flag is then arranged in rough folds from the

center to the outside of the rosette, and projecting corners are pinned under, so as to make the edge circular (Fig. 6). The whole must be pinned together firmly as it lies on on the floor, and then it can be fastened with tacks to the wall of the

Fig. 1.

house. If, instead of one flag, two be pinned together lengthwise, so that the unions adjoin, the stars will be at the center of the rosette. Many other designs can thus be formed of one or more flags, by any one with

ingenuity. Strips of colored bunting may be arranged in festoons, or wound spirally about the posts of verandas. Little flags, about six inches long, can be utilized by fastening them in rows, or arranging them to form figures or letters. Patriotic

may be displayed on the walls, and if there is in the house some relic of the Revolution, an old sword or musket,

Fig. 3.

for instance, it should be brought out and similarly draped.

Evening Decorations. In the evening the house and yard may be illumi-

Fig. 4.

nated; that is, brilliantly lighted. The simplest way to illuminate a

Fig. 2.

mottoes may be made of letters cut out of red and blue paper, and framed in flags. For the interior of the house, red, white, and blue flowers are the best decoration. Portraits of eminent Americans, draped in flags,

Fig. 5.

house is to open wide all the blinds and curtains and place one or more

lights in each room. The house may be made more brilliant by placing candles in the windows. Cross bars are often made to fit on the inside of the sash, and on these, bits of candle about three inches long are fastened in rows. Colored designs

should never bend down close to a cracker to see whether or not the fuse has gone out. Persons have been seriously injured by the explosion in their faces of crackers, especially of cannon-crackers, an accident with which might be serious. Poor crackers may be

Fig. 6.

may be cut from tissue paper and hung in the window, with lights directly behind them. Designs made thus can be pasted on the panes and will give the effect of stained glass at a distance. They can be washed off afterwards with hot water. Chinese or Japanese lanterns are very effective. The usual way of arranging them is on strings, or wires, which are festooned from one tree or post to another.

Fire-crackers and Fire-works. These are described in C. C. T. The noise of fire-crackers, when set off in packs, is much increased by placing them under a box or barrel. When fired singly, the knot at one end of the pack must be untied, and the crackers can be then easily pulled out, one by one. It is usually better to break off part of the fuse before lighting, as the end burns slowly and is apt to go out. If the cracker is to be exploded in the air, it should be held in the hand, and thrown just as the fuse has burned down to the end. Many fuses burn by fits and starts, so one



Fig. 7.—Fizzer.

made into "fizzers" by breaking them in two, placing on the ground, and applying a piece of punk to the broken place, taking care that the fingers are not in the way of the flame which shoots out. A fizzer may be held in the thumb and finger, in such a way that the flame cannot reach the hand, from whichever end of the cracker it may issue. Fire-crackers may be fired by electricity, by winding around the fuse, close to the cracker, a piece of platinum wire connected with an ELECTRIC BATTERY. When the circuit is closed the wire will be heated red-hot, lighting the fuse and exploding the cracker. The wire should be connected with the battery before trying to fire the cracker, to see whether it will heat it red-hot. If not, either the wire is too large or the battery not strong enough. Very fine iron wire will do as well as platinum if it can be obtained, and is not so expensive. To explode the cracker instantaneously, which is not done by the above method, a needle must be passed through it, and the wire threaded through the hole thus made, instead of being wound around the fuse. For an

ordinary exhibition of fire-works, a post must be prepared for fire-wheels, and a trough for rockets. It is a good plan to have the wheels fastened to the post all ready to light, and to see that they revolve easily, so that

trough but stand alone, the stick being made in three pieces, which open out to form legs like those of a three-legged table (see Fig. 9).

Fire-crackers and fire-works are usually lighted by punk, which is made of any substance which will smolder slowly without flaming. One kind may be made at home by soaking strips of ordinary thick pasteboard in salt and water, and other kinds may be bought. Instead of punk, pieces of exploded fire-crackers may be used. It can be put out by rubbing the lighted part off on a stone.

Chromotropes, revolving colored designs, lighted from behind. They consist of two parts, a fixed and a moving part. The fixed part (Fig. 10) may be almost any design,

Fig. 8.

there will be no trouble when evening comes. If it should be necessary to start the wheels, as it often is, it should be remembered that they turn in the opposite direction from that of the sparks. The rocket trough can be made of two boards, each

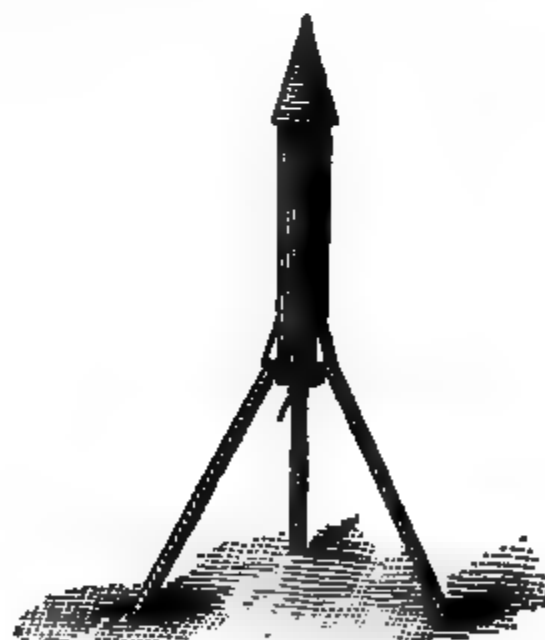


Fig. 9.

above five feet long and four inches wide, nailed together at right angles along the edges. It is leaned against a fence, and the rockets are placed in it, one by one, just before firing (Fig. 8). Tripod rockets require no

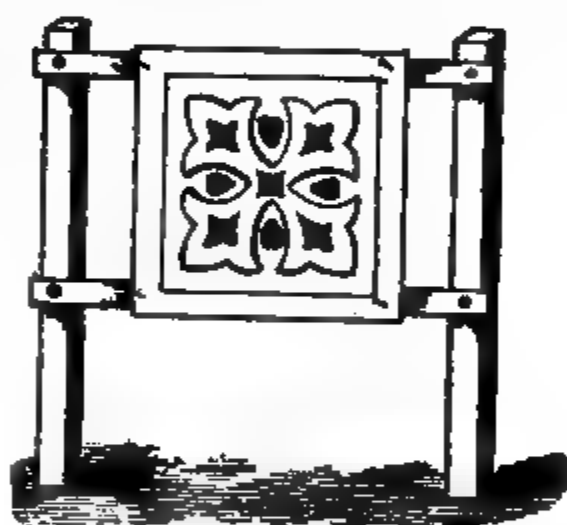


Fig. 10.

cut out of thick paper; the moving one (Fig. 11), which revolves behind

Fig. 11.

it, is painted with transparent colors on oiled paper in a spiral pattern.

Or it may be composed of strips of colored tissue paper pasted on a background of white tissue paper. The moving part is stretched on a barrel hoop, across which a lath is nailed (Fig. 12). A hole is bored

on the Fourth of July in the same way as those described above, by

Fig. 12.

through the center of the lath so that the whole can be made to revolve on a nail in an upright post, close behind the fixed design. One or more lamps are held just behind the Chromotrope, and then the barrel hoop is spun around by a person standing at one side. The effect is very pretty, as the changing colors are seen through the holes in the fixed piece, and forms a good substitute for fire-works. Chromotropes made of glass are often shown on screens by means of the MAGIC LANTERN. The word Chromotrope is from two Greek words, *chroma*, color, and *trepein*, to turn. It is sometimes called, also, "Chinese fire-works." The inventor, Mr. Allen, an Englishman, called it "pyreidrotrope," from the Greek *pur*, fire, *idein*, to see, and *trepein*, to turn.

Another kind of Chromotrope consists of three disks which partially overlap, as shown in Figs. 13 and 14. Each disk has several different colors, and as the disks revolve the colors appear to change. These can be made on a large scale for exhibition

Fig. 13.—Front View.

stretching oiled paper or tissue paper over barrel hoops.

Fig. 14.—Rear View.

Day Fire-works, colored paper cut into different shapes and scattered through the air in various ways. The simplest way is to throw them from a window. Descriptions of some kinds are given below, and others can easily be devised.

1. *The Whirligig*. A square piece of paper is cut and folded to

make a windmill as shown in Fig. 15. A pin is passed through the mid-

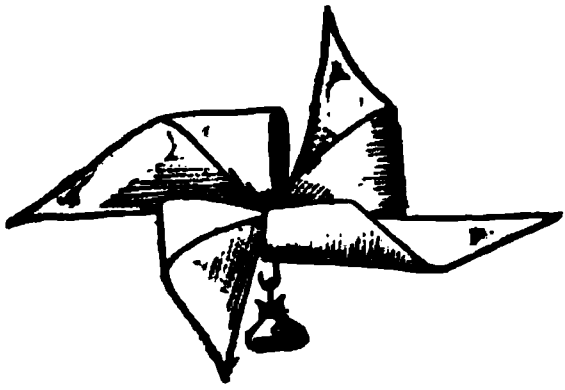


Fig. 15.

dle, the point is bent into a hook, and to it is fastened a slight weight, like a very small pebble, or a shot, wrapped in tissue paper and hooked to the pin. When such a whirligig is thrown from a window it will spin rapidly as it falls, and a number of them of various colors, falling at once, make a pretty sight.

2. *Spirals.* These can be cut

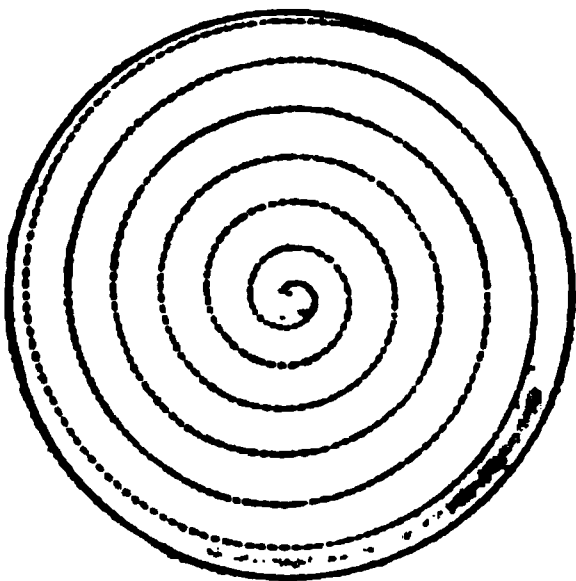


Fig. 16.

from circular pieces of paper as shown in Fig. 16, and then pulled



Fig. 17.

out, as in Fig. 17. When dropped, they too will spin around.

3. Shreds of gilt or silvered paper : and stars, circles, or other figures of the same material may be thrown into the air in great numbers.

4. *Bombs.* Another way of discharging Day Fire-works is by means of a bomb, which consists of from four to eight whalebones fastened to two curtain rings. The rings are tied together with three strings. The whalebones are fastened tightly to the lower ring but the ends are merely caught under the upper one, so that a slight knock will dislodge them (see Fig. 18).

Quantities of paper fire-works are secured very loosely around the top

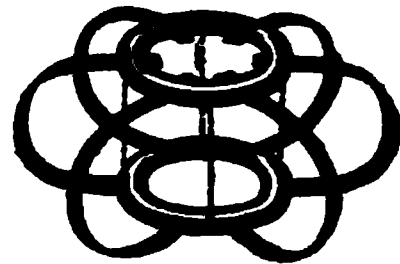


Fig. 18.

ring, so that when the whalebones are released they will be thrown in all directions. There are several ways of setting the bombs off. One is to fasten a string to the lower ring, pass it through the upper, and then, holding the end, drop the bomb, giving the string an upward jerk just as it reaches its full length. Another is to pass it over an upright fixed pole, arrange the string as before, pass it over a pulley at the top, and haul up the bomb. When the top ring hits the pulley, the whalebones

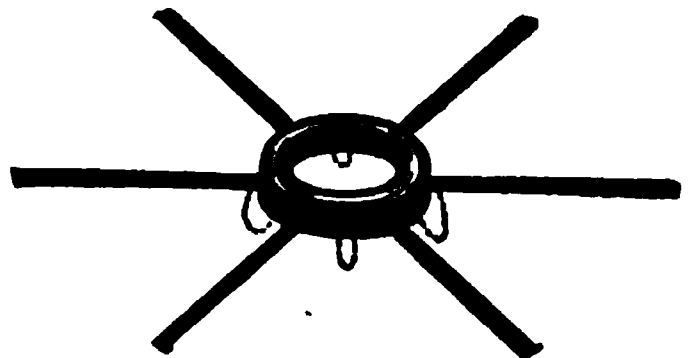


Fig. 19.

will be dislodged and the fireworks will fly (see Fig. 19).

Balloons. Large balloons are described in C. C. T. Toy balloons,

made of tissue paper, which can be bought at toy stores or made at home, are often sent up on the Fourth. Home-made balloons are constructed by pasting together gores cut out of tissue paper and shaped as in Fig. 20.



Fig. 20.

One of these is folded lengthwise down the middle and a second placed on it so that only a little margin of the first shows; this margin is lapped over and pasted to the second, which is then folded lengthwise like the first. The desired number of gores is pasted together thus, and then the free edges of the first and last are pasted, thus forming the complete balloon. The shape of the balloon depends on the shape and number of the gores. Different shapes are shown in Figs. 21, 22, and 23. The length of

Fig. 21.

the line A B, allowing for pasting, multiplied by the number of gores, is the circumference at the neck, and

that at the largest part may be found in like manner. The length of the balloon will be somewhat less than that of the gores. The best shape for a balloon is as nearly spherical as possible. A narrow balloon, or one

Fig. 22.

with a neck, takes fire easily. When the tissue paper has been pasted, a circle of wire the size of the opening at the neck, is made, with two cross pieces at right angles, and fastened by lapping the paper over it and pasting. A paper loop is pasted at

Fig. 23.

the top of the balloon, and a small ball of lamp-wick, about an inch thick, is rolled together and fastened by passing wire through it (Fig. 24). The ends of the wire are hooked so that the wick can quickly be fastened

to the wire cross at the neck of the balloon. A plan of the arrangement



Fig. 24.

is shown in Fig. 25, and a perspective view in Fig. 26. To send up the balloon the best plan is to make a fire of sticks or shavings on the ground, and put above it a piece of stove pipe to conduct a current of the heated air upward. The neck of the balloon is held over this by one person, while another holds the top up by a stick passed through the paper loop. Where the balloon is full of hot air, the wick is saturated with alcohol,

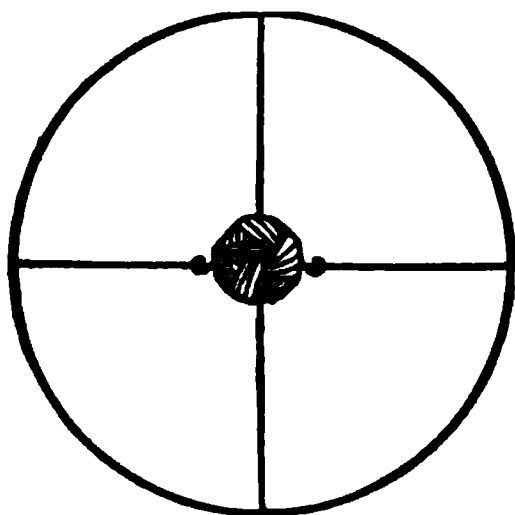


Fig. 25.

hooked to the wire cross pieces, and lighted, and the balloon, being released, rises in the air. Care must be taken to hold it so far above the fire that there is no danger of its burning. The balloon would rise a little way without any lighted wick, but the latter is necessary to keep the air within it heated. For a small balloon it is not necessary to build a

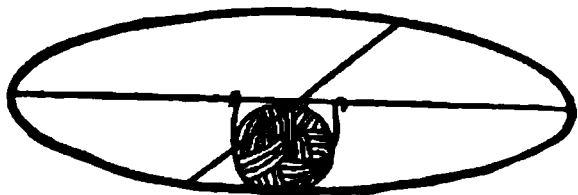


Fig. 26.

fire, but simply to light the wick, and hold the balloon till the air is heated enough; but a large balloon needs a better and quicker mode of filling it with hot air. If a wind is blowing,

the balloon should be sent up from the sheltered side of a building, and care must also be taken that no tree or building is near enough to its path to obstruct it as it rises.

Toy balloons are sometimes arranged to carry up fire-works which are set off in the air. Any fire-work not too heavy may be fastened by a string to the middle of the cross pieces, a piece of slow-burning fuse being attached and lighted just before the balloon is sent off. In the case of most fire-works the explosion would destroy the balloon. A small rocket may be thus taken up, being suspended by two strings, so that it will point horizontally, or slightly upward. A good plan is to open a roman candle, take out the stars, and wrap each in tissue paper with a little powder. The stars are then arranged at intervals on a string and a fuse running through them all is lighted at the lower end as the balloon is set off. The stars explode one by one in the air.

Parachutes, (C. C. T.). Toy parachutes can be made by crossing two long pieces of string cornerwise on a square piece of tissue paper, and then pasting another piece to it, so that the string is thus fastened between. The ends of the string are then tied together and fastened to a small weight, for instance, a lead fish-line sinker. The parachute may be attached to a fuse, like the fire-works, so that when the fuse burns up to it, it will fall. It should be fastened to the balloon at the middle of the paper, where the strings cross, and will hang down like a closed umbrella; but when it falls it will open and then drop very slowly. Fire-works may be fastened to a parachute instead of to the balloon.

Fourth of July Parties. Public celebration of the Fourth used always to include the reading of the Declaration of Independence, a patriotic oration, and a parade. Fifty years ago such celebrations were held in almost every town;

The orations were often very flowery and boastful, a style of talking now often called "Fourth of July oratory." These public celebrations are less frequently held than formerly, but friends now often meet at a party or a picnic, and indulge in amusements appropriate to the day. An excursion to some place of historical interest may be made, especially if it be connected with Revolutionary history.

FOX AND GEESE, a name given to several different games. I. A game played by two persons, one of whom has one piece, or man, called the Fox, and the other 17 men, called Geese, on a board like that in Fig. 1. The Fox is usually larger

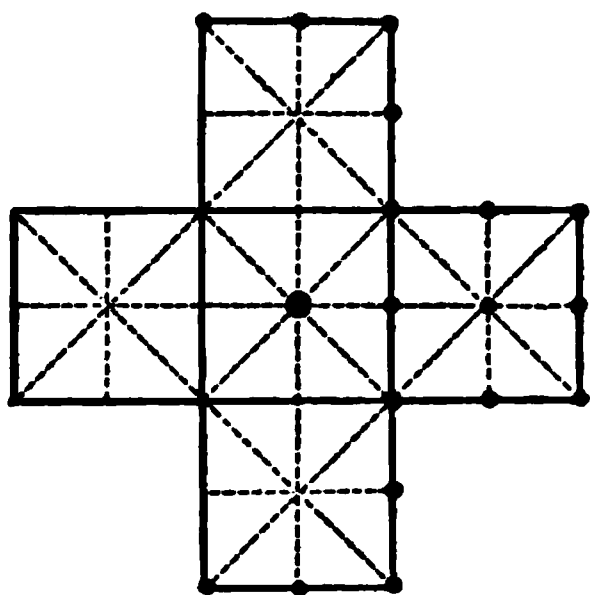


Fig. 1.—Fox and Geese.

than the Geese, and of a different color. At the beginning of the game the pieces are placed as shown in the illustration, the Fox being in the middle of the board. The players take turns, the Fox moving first. The pieces may move from one dot to the next along any line. The object of the Geese is to pen up the Fox so that he cannot move, and that of the Fox is to capture so many of them that they cannot do this. The Fox may capture a Goose by leaping over it, if the space next beyond it be unoccupied, as in CHECKERS, and the Goose so leaped is removed from the board. The Fox is not obliged to leap when he has a chance, but

may move instead, if he wishes. The Fox cannot be penned anywhere by less than six Geese, as will be seen by looking at the board, and therefore when only five Geese are left, the Fox has won. If the Geese are played skillfully, it is said that they must always win, and the game is therefore sometimes played with two Foxes. Holes may take the place of the dots on the board and the game is then played with pegs or marbles instead of men. It may be so played on a SOLITAIRE board.

The Battle Game, or Siege, a kind of Fox and Geese in which part of the board is separated from the rest, as shown in Fig. 2.

This is called the Fortress, and is occupied at the opening of the game by two Sharpshooters, who correspond to the two Foxes in the older game. The rest of the board is called the Battlefield, and is occupied by 24 common Soldiers, who are like the Geese. The Sharpshooters may stand anywhere within the Fortress at the beginning of the game, and they can move from one spot to the next, in any direction, to any part of the board. A Sharpshooter can take any Soldier by leaping over him to the next spot beyond, if it is vacant, as in CHECKERS. The Soldiers can move forward (either straight or diagonally), or sidewise, if in so doing they approach the Fortress, but never backward, and they cannot take the Sharpshooters by leaping. The player who moves the Soldiers wins if he can place his men so that the Sharpshooters cannot leave the Fortress, or if he can pen them up in any part of the Battlefield, so that they cannot move at all. The one who has the Sharpshooters wins if he can take so many of the Soldiers that not enough are left to pen him up. This is done when he has captured all but nine. As a Sharpshooter, when in the middle of the board, can move in any one of eight different directions, he has great power. The same Sharpshooter is

allowed to make as many leaps as he can in one turn, as in Checkers.

History. This variation of Fox and Geese is called in Germany

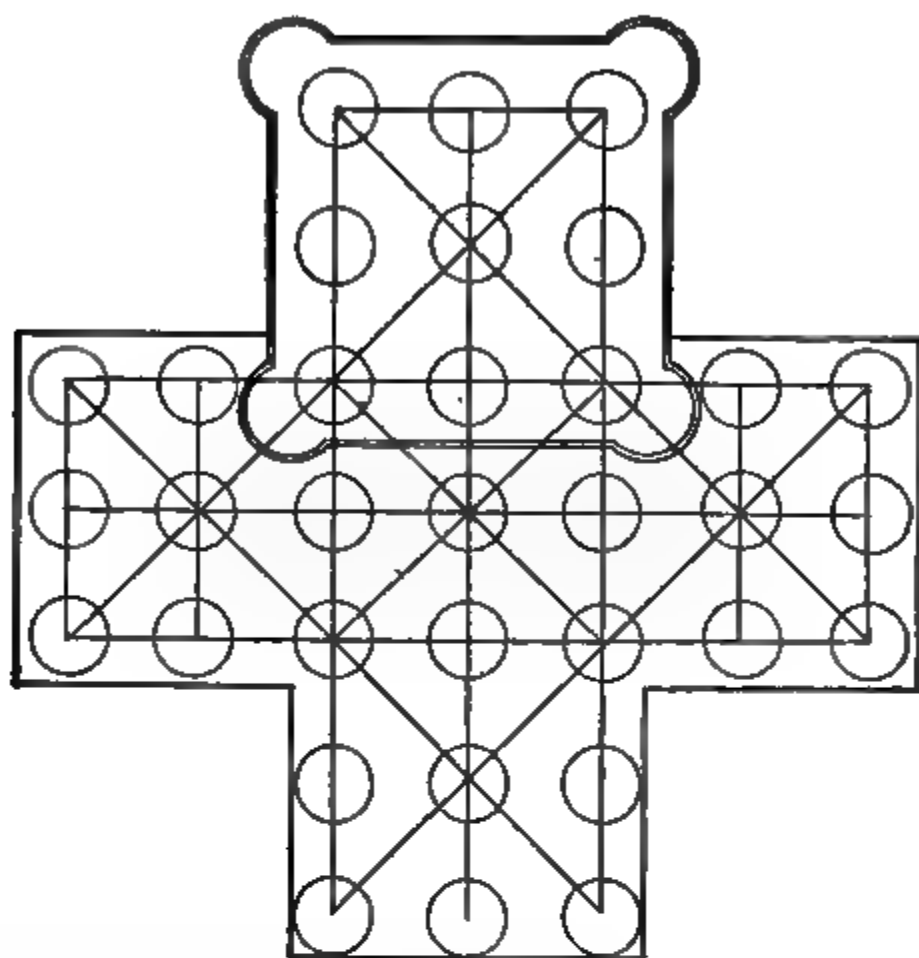


Fig. 2.—Battle Game, or Siege.

"Belagerungsspiel" (The Beleaguering Game). Though it is an old game, a description of it was recently published in a New York paper as if it were a new invention.

Chinese Fox and Geese. This is played on a board like that in Fig. 3, which also shows the arrangement of the men. The Commander (corresponding to the Fox) is placed in the middle and surrounded by 26 soldiers (corresponding to the Geese). The Commander may take a soldier by leaping, as in CHECKERS, and all the pieces may move forward, backward, or sidewise. The object of the soldiers is to pen up the Commander in the triangular space *a, c, b*. As in ordinary Fox and Geese, the soldiers will always win in this game if it is played well. It is sometimes called the "Chinese Rebel Game."

and the Chinese call it *Yang Lo See*, after the leader of a famous rebellion.

Fig. 3.—Chinese Fox and Geese.

French Military Game. This resembles Chinese Fox and Geese. A

black piece, called an Army Corps, corresponds to the Fox, and the three pieces of a different color called Brigades of Cavalry, to the Geese. The object of the Cavalry, as in the other forms of the game, is to pen up the Army Corps so that it cannot move. The Army Corps is allowed to move in any direction along a line, but each Brigade of Cavalry can move backward only once during the game, all other moves being forward or sidewise. The Army Corps is given the first move. This game is said to have been devised by Louis Dyen, a French army officer, in 1886. It has been shown in a French scientific paper that, as in other forms of the game where there is one Fox, the Geese (in this case the Brigades of Cavalry) must win, if played properly.

II. A game played by any number of persons, one of whom takes the part of the Fox and the others stand in a double circle, facing inward. At one place in the circle there are three players instead of two as shown in Fig. 4. The object of the Fox is to

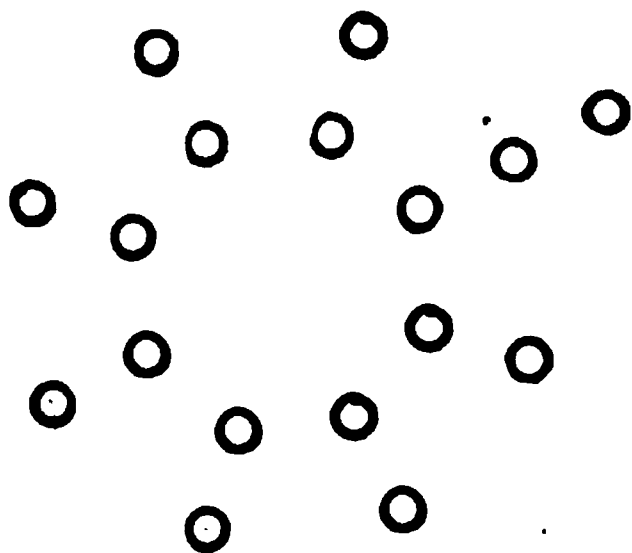


Fig. 4.—Fox and Geese, or Tierce.

touch the outside one of three, who tries to escape by running into the circle and standing inside two of the others, thus exposing the outside player to the Fox. If any one is caught he must take the Fox's place. When the number of players is large there may be two or more groups of

three. The Fox may not enter the circle, and there should be plenty of room left between the groups of players, so that the Geese may run in easily.

In England this game is sometimes called Round Tag and Tierce. Its ancient name was The Faggots, the pairs of players, one in front of the other, being called Faggots, and the Fox and Goose the Hound and Hare. A similar game was played there in ancient times, called Trick the Rabbit.

In France it is called *Deux c'est assez, trois c'est trop* (Two is Company, Three is a Crowd), and in Germany, *Den Dritten Jagen* (Hunt the Third).

III. An outdoor game played by any number of persons on a figure marked on the ground or in the snow, like that in Fig. 5. There may be any

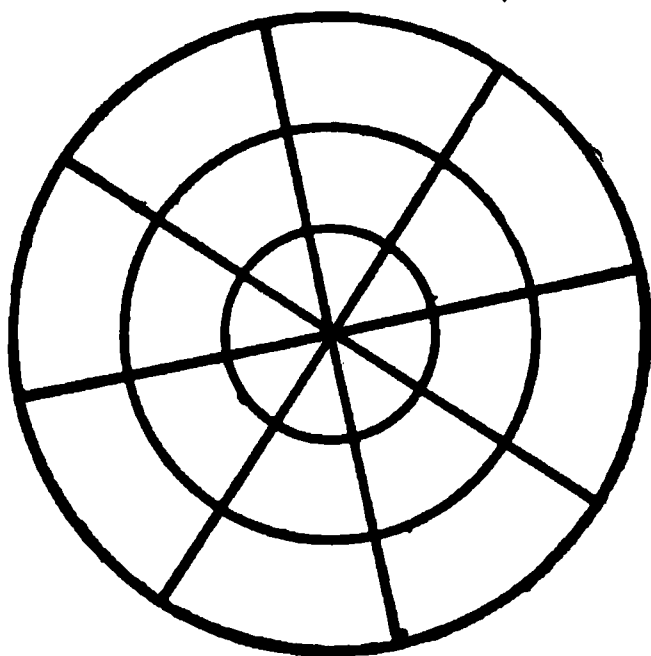


Fig. 5.—Fox and Geese.

number of circles and lines according to the number of players and the size of the ground. One of the players is selected as Fox, and the others represent Geese. The Geese may run on any of the paths, but the Fox must keep on the straight ones. If he touch any one of the Geese, that one must take his place as Fox. In some parts of New England this game is called Pickadill.

FRENCH AND ENGLISH. See TUG OF WAR.

FRENCH BLIND MAN'S BUFF, See BLIND MAN'S BUFF.

FRENCH SOLITAIRE, a SOLITAIRE game of CARDS, played with one full pack. The four Aces are placed in a row, as they appear, and the other cards on these, in order, without following suit. Cards that cannot be so placed must be arranged in four piles beneath the others, without regard to suit or rank. The top card of a lower pile must be placed on one of the upper piles whenever possible. It requires skill so to place the cards in the lower piles that they will be available in making the upper piles. No cards in any of the lower piles must be looked at, except the top card.

This is one of the simplest Solitaire card-games. It is made more difficult by requiring the upper piles to be made in suits, and still easier by permitting the player to examine the lower piles.

FUN ALIVE, a game played by any number of persons with 8 large cards called "Game Cards," and 40 smaller "Forfeit Cards." The Game Cards are all blank except one, called the "Catch Card," on which the words "Fun Alive" are printed in large letters. On each of the Forfeit Cards a FORFEIT is printed. The Forfeit Cards are spread, face downward, in the middle of the table, and the game is begun by one player's taking the Game Cards, shuffling them, and presenting them to his left-hand neighbor, who draws one. If it be the Catch Card, he must at once draw a Forfeit Card, and do as it directs. Then the player who draws, shuffles the Game Cards and presents them to his left-hand neighbor, and so on. When a player draws a blank card he takes no Forfeit Card, and the next one draws at once. The game continues thus as long as the players choose.

FUNGO, a game of ball played

by any number of persons with a BASE-BALL and bat. One player takes the bat, and tossing the ball into the air strikes it before it falls. The other players, who stand from 50 to 200 feet from the batter, try to catch the ball. The batter usually holds the bat in his right hand, tosses the ball into the air with his left, at the same time raising the bat, and then, seizing the bat with both hands, strikes the ball before it falls. Fungo is generally played to give the fielders in BASE-BALL practice in "fly-catching" or catching the batted ball before it bounds, but it is often played merely for amusement. In the latter case it may be agreed that when a catch is made, the catcher shall take the batter's place.

FUSIBLE METALS, To make. Fusible metals are alloys (see C. C. T.) which will melt at a very low temperature. Many of them are made of bismuth, lead, and tin. The fusible metal called Rose's Metal is made by melting in an iron spoon some bismuth with half its weight of lead and half its weight of tin. The resulting alloy will melt in boiling water. If the melted metal be poured into a test tube it will expand on cooling, and break the tube.

These fusible metals are made use of in many ways. For instance, many factories are now fitted with water pipes running over the ceilings of all the rooms. These are fitted at intervals with nozzles closed with plugs of fusible metal. If a fire should start in any room the heat would melt out the plugs near it at once, and the water, rushing through the nozzle, would put it out. Common solder is another example of a fusible metal, though this must melt at a higher heat, so that it will bear that of a ordinary cook stove.

G

GALLANTY SHOW, a kind of shadow pantomime, in which the characters are represented by figures cut from cardboard. A frame about three feet high by four wide is fixed in a doorway, and covered with white cloth tightly stretched, tacked on the side toward the spectators. The rest of the doorway is screened by curtains, and the exhibitor stands on the opposite side. A piece of tape, stretched close to the frame along its bottom, holds the figures by means of cardboard continuations of their legs. The exhibitor, by means of these continuations, which project below the tape, can slide the figures along, make them rock backward and forward, or cause them suddenly to disappear by pulling them downward. Scenery of various kinds may be fastened to the sides or top of the frame, and if a scene is desired which will fill the whole frame, the cloth may be replaced by a sheet of paper on which such a scene, cut out of thin paper, is pasted. A forest or the interior of a building may thus be represented. With some practice, scenery can be built up of different thicknesses of paper, so as to show any number of degrees of light and shade, after the manner of the porcelain transparencies often hung in windows. The "high lights" of the scene have no paper pasted on them at all. The deep shadows should have several thicknesses, and the shades between these extremes more or less according to the desired tone. For the stained glass windows of a church, colored tissue paper may be used, and the sun, moon, or flowers may also be represented in color in the same way. If desired, the arms or heads of the figures may be made to work on pivots, and moved by

thread so fine that its shadow is not noticed by the spectators. The performance may be a pantomime, or the exhibitor may talk for the various characters. The figures not used should be placed on a chair or shelf within easy reach of the exhibitor, or held by an assistant. A procession can be represented by gluing figures upright on a piece of tape stretched around two wooden wheels, or large spools. One of these is fitted with a crank, by turning which the tape is moved

Gallanty Show.

steadily. Only the upper part of the tape must be thrown on the screen, as the figures on the lower half are heads downward. The shadows must pass out of sight before they begin to turn downward, and must not come into view again till they have ceased to rise. A continual procession thus passes

across the screen as long as the crank is turned. A great many curious effects can be produced, as in SHADOW PLAYS. Thus, a man can be shown climbing out of a chimney or jumping into a crocodile's mouth. These effects are even more simple in a gallanty show, for the figures and scenery are both smaller and easier to manage. Care should be taken to make all the movements as naturally as possible.

History. A gallanty show is called in France *Les Ombres Chinoises* (Chinese Shadows). This form of entertainment is said to have originated in China; at any rate, it has long been a favorite there. It was brought thence to Germany, and in 1770 a theatre specially devoted to it was established in Versailles, France, by Seraphin, who conducted it for many years and was succeeded in its management by his nephew of the same name.

GALVANIC TASTE, Experiment on. Place a piece of zinc above the tongue and a silver coin below it, or *vice versa*, and after leaving them there a few seconds, to get used to the taste of the metals, touch the edges over the tip of the tongue. A singular taste, or sensation, will be at once felt in the tongue. The reason of this is that the metals, with the tongue between them, form a little ELECTRIC BATTERY, and when the circuit is closed, by touching the metals a very slight current flows through the tongue.

The taste is slightly different, according to which metal is above and which below, being slightly acid in one case and alkaline in another. Some people think this is because the salt fluids in the tongue are decomposed by the current into an acid and an alkali (see ELECTRICAL DECOMPOSITION).

A similar experiment may be performed with a strip of zinc and a silver spoon, by putting one as far as possible between the lower lip

and gum, and the other between the upper lip and gum, and then touching the ends. Just as they touch, a flash of light will appear to pass before the eyes.

GALVANOMETER, an instrument for showing the direction and force of electric currents. Some kind of galvanometer is needed for many of the electric experiments described in this book. The simplest kind consists merely of a magnetized sewing-needle, hung horizontally by a thread; or a pocket compass may be used. The following experiments may be tried with such a galvanometer.

1. Allow the needle to come to rest, when it will point north and south. Hold a wire, whose ends are connected with an ELECTRIC BATTERY, over it lengthwise. The needle will turn, and if the current in the wire is strong enough, will come to rest nearly at right angles to the wire.

2. Reverse the current in the wire by exchanging the ends which are connected with the battery. The needle will turn in the opposite direction.

3. Hold the wire just under, instead of just over, the needle. It will turn in the opposite direction.

4. Make a loop of the wire so that the current will flow in one direction above the needle and in the opposite direction below it. The needle will turn farther than before.

These experiments, which were discovered by Oersted, a Danish physicist, first showed scientists that there was a connection between electricity and magnetism, and they were therefore the beginning of the telegraph, the dynamo, and many of the wonderful inventions of our day.

To detect very slight currents it is necessary to surround the needle with many coils of wire. Thus very expensive and delicate galvanometers are constructed, but a simple one can be made by any one, as follows:

Make a wooden frame, A, about four inches square and about an inch thick, either glued together or fastened with brass or wooden pins. No iron or steel must be used. Wind on it about 60 turns of insulated number 16 wire, in three layers, leaving a space in the centre, as shown in the picture. Insert the



Home-made Galvanometer.

ends of the wire in the brass binding-screws H and K. Fix an arch of copper wire, D, in the frame, on which is a cork, E. From the cork is suspended a narrow strip of paper-G, by a silk fibre or a hair, F. No twisted thread must be used. The hair is best fastened to the paper by wax. Through the lower part of the paper thrust a magnetized sewing-needle, H, and through the upper part a copper wire, I, about 2½ inches long, for a pointer. The paper must be so suspended that the needle will turn freely between the upper and lower windings of wire, and the pointer above the wire, where it will be easily seen. If desired, a dial or disk of paper, M, may be laid over the wire just under the pointer. A hole must be cut in the centre, to allow the suspended

strip of paper to turn. This galvanometer must be kept out of the least draught of wind, and it is best to cover it with a glass globe, or with a box, N, having a glass top, O. When it is to be used with weak currents, it must be turned so that the coils of wire are parallel with the needle, that is, north and south. When the instrument is used with stronger currents it must be placed at first so that the coils will point across the needle. When the current passes turn the instrument back slowly till the coils are north and south. A strong current must not be passed through it when the coils are parallel with the needle, or the needle will spin around, twisting the hair and making it necessary to hang it over again.

GAS BURNED THROUGH A HANDKERCHIEF.

Tie an ordinary handkerchief tightly over a gas-burner with metal tip, as shown in the illustration on next page. Unless the tip be metal, the experiment will not succeed. Turn on the gas and light it, and it will burn without even scorching the handkerchief, which may be removed uninjured when the gas has been turned off. The reason the handkerchief is not burned is that there is not great heat in the lower part of a gas-flame, and what there is, is conducted away rapidly by the metal tip of the burner. If the tip be not metallic the heat will not be conducted away, and the handkerchief will be scorched.

GENTEEL LADY, a game played by any number of persons. The leader of the game says to the player on his right, "Good morning, genteel

lady, always genteel; I, a genteel lady, always genteel, come from yonder

two-horned, to tell you," etc. An extra horn is given for every mistake, and the number generally increases rapidly. The game lasts as long as the players desire, or it may cease when one of them has a number of horns that is agreed upon beforehand. Sometimes, at the close of the game, each player pays as many forfeits as he has "horns" on his head. In beginning the game, the leader may substitute anything he chooses for the "eagle;" thus, he may speak of a house with a gold chimney, diamond windows, and iron roof; or a locomotive with a paper smoke-stack and India-rubber wheels.

Sometimes the first player informs the second that his "ship has just come from China, laden with apricots" (or anything beginning with A). The next adds an article beginning with B, and so on through the alphabet. The "horns" are sometimes lighted paper lamp-lighters, but their use is dangerous.

This game had its origin in France, where it is called "*Le Chevalier Gentil*" (The Gentle Knight).

GEOGRAPHY, the name of several games, all of which require a knowledge of geography.

I. The players choose sides, and the leader of one side commences by calling out the name of a city or town beginning with A, and then counting ten distinctly. Before he finishes counting the leader of the other side must call out the name of another city beginning with A, and then count in like manner. This goes on till the leader of one side is able to count ten before his opponent can think of a city that has not been named. The winner chooses as his follower one of the opposite side, and then begins the game anew, this time using names of towns that begin with B. The leader can be chosen only when he is left alone on his side. When either side has chosen all the players on the other, it wins, and the game

Gas burned through a Handkerchief.
(See page 367.)

genteel lady, always genteel, to tell you that she has an eagle with a golden beak." This sentence is repeated by each in turn to his right-hand neighbor, and then goes the rounds again as many times as the leader chooses, each time with an addition to the description of the eagle. Thus, in the second round, it may be "with a golden beak and silver feathers;" in the third, "with a golden beak, and silver feathers, and steel claws," and so on. Every time that any player makes a mistake, a piece of paper is twisted in his hair to resemble a horn, and he is then called "one-horned," "two-horned," etc., as the case may be, instead of "genteel." Thus, if a player have no horns, while his left-hand neighbor has two, and his right-hand neighbor one, he should address the latter with the words, "Good morning, one-horned lady, always one-horned; I, a genteel lady, always genteel, come from yonder two-horned lady, always

ends; but if all the letters of the alphabet have been used, and players remain on each side, the larger party is declared the winner. No one but the leader may call out the names, but the other players on his side think of new ones and whisper them to him one by one as he needs them. At first the names usually follow one another as quickly as they can be spoken, but when the memory of the players is almost exhausted, they come slowly. A longer time for thought may be given by counting 25, or even 50, instead of ten, and the game may also be varied by using names of rivers or mountains, or those of historical characters.

RULES OF THE GAME.

1. No city may be named more than once, but different places of the same name may be used, if their situation is clearly defined, either by giving the State or country where they are, or in any other way; as, "Stratford, Connecticut," and "Stratford-on-Avon," or "Philadelphia, where one of the seven churches was situated." In such a case only the name, not the explanation, must be spoken before the word "ten."

2. In case an unfamiliar place is named, the side that used it may be required to tell where it is. If they cannot do so, or do so incorrectly, the opposite side may choose one of their players and proceed to the next letter.

II. The leader on one side calls out any letter, and says, "Sea," "Bay," "Mountain," "City," or some other division of water or land. The leader on the other side names one beginning with the letter mentioned, and is followed by all on his side in regular order. If any one pause, the leader of the first side counts ten, and says, "Next!" and the pausing player takes his seat unless he can answer while the leader is counting. The leader of the second side now calls out a

letter and a division of land or water, which the players on the first side must give in like manner, and the sides continue to alternate thus. If any one make a mistake, such as giving to a river the name of a mountain, or using the wrong initial letter, it must be corrected by some one on the same side before the opposite leader says "Miss," otherwise the opposite side scores 2, and the turn comes to an end. If no one on a side makes a mistake or is obliged to take his seat, that side scores 3. A side wins when it has scored 10, or when all on the other side have taken their seats.

III. Another game of geography is played with pencils and paper, every one writing all the geographical names he can think of, beginning first with A, then with B, and so on through the alphabet, a minute or more being allotted to each letter. If all have the same name on their lists, it scores nothing, but others score as many points as the number of players who have omitted it, as in the game of DICTIONARY.

IV. Another geographical game is played with a board on which is a map, having holes in place of spots to represent cities. Each hole has its corresponding peg with the name of the city on it, and the object of the game is to place the pegs aright. The game may be played in various ways. A single player may treat it as a game of PATIENCE, placing all the pegs and then comparing an ordinary map with the board, to see whether he has succeeded or not. When there are several players the pegs may be distributed equally, and then each in turn places one of them in a hole. After each play the other players examine the peg, and in turn have a chance to say whether or not they think it is rightly placed. If all agree that it is right, the player scores one point; if one or more think it is wrong, a map is consulted, and if the objectors are right they

each score one, while if they are wrong one point is subtracted from the score of each. The number of points necessary to win should be agreed upon beforehand.

A board for playing the game can be made by pasting an ordinary map on a smooth piece of wood, and boring gimlet holes through the dots representing the cities. The name of each city must be carefully erased with pen and ink, and then little wooden pegs must be provided, which may be made of matches. The names may be written on the side of the pegs, on a place shaved flat with a knife, or on bits of paper glued to the top of the pegs.

GIVE-AWAY. See CHECKERS.

GLASS OF WATER, Experiment with. See COINS, Experiment 7.

GO-BANG, a game played by two to five persons, each of whom has usually 50 pieces or men, on a board divided into 256 squares colored alternately dark and light. The pieces are of different colors, and each player has one color, that one set may be distinguished from the others. The players take turns, each in order placing on the board one of his pieces, on any unoccupied squares, dark or light. The object is to get five in a row, either diagonally or from side to side of the board, and he who succeeds in doing this wins the game. When the players have put all their pieces on the board, they may move them one at a time to any unoccupied adjacent square, in any direction.

Go-Bang may be played on an ordinary checker-board, each player having twelve pieces. Sometimes the total number of pieces is made equal to the number of squares, in which case there can be no moving of pieces, and the game ends when all are placed on the board, if no one has made a row of five before that time.

Go-Bang is a Japanese game, and means in the Japanese language "Five-Board." "Go" (Five) is the

Japanese name of the game. It is said to have been played in China (where it is called *Kee*) 2000 years before Christ, and to have been carried about the 8th century A.D. to Japan, where it is a great favorite. The Japanese have schools for the study of the game, and a periodical is published in their country devoted entirely to it, just as we have papers devoted to Chess. The Japanese play it on a board of more than 300 squares.

GOLF, a game played by any number of persons with sticks or clubs like SHINNY sticks, and small balls about an inch and a half in diameter. The ball, formerly of leather stuffed with feathers, is now usually made of gutta-percha, "nicked" or cut in crossed lines on the surface, to roughen it.

The course, usually circular and properly between three and five miles long, is marked out on a piece of open ground, and at intervals on it are cut holes four inches in diameter and from 100 to 500 yards apart. The golf grounds are usually called "links," because the sandy stretches by the seashore, known in Scotland by this name, are there regarded as best adapted to it. The links should contain "hazards"—a general term for obstacles of any sort (see Rule 15, below). Two players, starting from the first hole, take turns in striking their balls into the next, and he who does so in the fewest strokes scores a point or "a hole," as it is called. They then play for the next hole in like manner, and so on till they have gone around the course (usually eighteen holes). If they make any hole in the same number of strokes, that hole is scored by neither. He who scores the greatest number of holes with the fewest strokes wins. The reckoning of the strokes is made technically thus: If a player's opponent has played one more stroke than he, the player's next stroke is called "the like"; if two more, "the one off

two," if three more, "the one off three," etc.

Each player has his own ball, and clubs of various shapes and sizes. He selects the one he needs at any particular time, according to the nature of the ground, and the others are carried by an attendant called a "caddie." Each club has its peculiar name. All have wooden handles, but are called "wood-clubs" or "irons," according to the material of the head. A wood club shod or soled with brass is called a "brassie." The following is a complete list of golf clubs: *Wood Clubs*—Drivers, Long Spoons, Mid Spoons, Short Spoons, Baffy, Brassie Niblicks, Bulger Drivers, Bulger Brassies, Brassies, Putters. *Irons*—Cleeks, Iron Niblicks, Putting Cleeks, Driving Cleeks, Lofting Irons, Driving Irons, Mashies, Gun Metal Putters, Medium Irons. The Driver or Play Club is generally used if the distance from the hole is too great to be covered in a single stroke; the Putter for striking the ball into a hole; the Spoon (now generally superseded by the iron clubs) for getting the ball out of a depression in the turf, called a "cup"; the Sand Iron for driving the ball out of a sand-pit or "bunker." Should the ball lie deep in the sand, or beside a stone, the Cleek or the Niblick may be used. Some golfers use the iron-headed clubs as "Putters." Besides these there are the Driving Iron (not so long a driver as the Cleek, but able to pitch the ball higher); the Lofting Iron, for lifting the ball very high; and the Mashie, a compromise between Lofting Iron and Niblick, used for short approaches. A set of six clubs is considered enough for an expert, and the beginner can get along with two or three. In striking the ball, the club must be held with both hands as close together as possible, the left being about two inches from the end. The club, grasped firmly with the left and guided with the right, is

"stance," is a matter about which there is a great difference of opinion among good golf players. The object is to stand so and at such a distance that the ball will be struck squarely behind and exactly in the middle of the club-head. If it strikes too near the end of the head (called the "toe") or too near the bend (called the "heel") it is said to be "toed" or "heeled" and will swerve to one side or the other. The majority of players place the right foot a little in advance. When thus standing, ready to strike, the player is said to "address" the ball. Before striking the ball it is customary to sway the club gently over it to measure its position. This movement is called the "waggle" and is done with the wrists only.

The last stroke between any two holes, by which the player tries to place the ball in the hole, is called putting (pronounced to rhyme with cutting), and is the most difficult part of the game, the preliminary strokes, called driving, being much more simple. The ground for some distance around each hole is usually covered with smooth turf and called the "putting green" (see Rule 30, below). In putting, the nature and condition of the ground, the position of the playing ball, and that of his adversary's must all be taken into consideration, as well as the state of the score, on which it sometimes depends whether the player will risk a difficult "put" or not. The stroke that drives the ball on the putting green is called the "approach shot." In putting, a rapid straight stroke is called a "gobble," and a successful long stroke a "steal." When the opponent's ball lies directly between the player's and his hole it is called a "stimy," and when the player sends his ball over the obstacles he is said to "loft over the stimy." When the player strikes the ground as well as the ball, he is said to "baff," and when his club razes the grass slightly he is said to "scruff."

When a hole has been gained the player lifts his ball and places it on a little heap of sand called a "tee," from which he plays it toward the next hole. When a ball is thus placed it is said to be "teed."

RULES OF THE GAME.

The following rules are substantially those of the St. Andrew's Royal and Ancient Golf Club, as modified in 1897 by the United States Golf Association:

1. The game of golf is played by two or more sides, each playing its own ball. Two sides of single players constitute a match called a "single." Two sides of two players each constitute a "Foursome."

2. The game consists in each side playing a ball from a tee into a hole by successive strokes, and the hole is won by the side holing its ball in the fewest strokes, except as otherwise provided in the Rules. If two sides hole out in the same number of strokes, the hole is halved.

"Match Play," in which the player has an opponent, is decided by the number of holes won.

"Medal Play," in which all the players are called "competitors," is decided by the aggregate number of strokes.

Unless otherwise agreed, a match shall consist of the play of the game over eighteen holes of the links.

3. The teeing ground shall be indicated by two marks placed in a line at right angles to the course, and the players shall not tee in front of, nor on either side of these marks, nor more than two club lengths behind them. A ball played from outside the limits of the teeing ground, as thus defined, may be recalled by the opposite side.

The option of recalling a ball is in all cases forfeited unless exercised at once before another stroke has been played.

The hole shall be four and one-quarter inches in diameter, and at least four inches deep.

4. The ball must be fairly struck at and not pushed, scraped, nor spooned, under penalty of the loss of the hole.

Any movement of the club intended to strike the ball is a stroke.

5. The game commences by each side playing a ball from the first teeing ground. In a match with two or more on a side, the partners shall strike off alternately from the tees, and shall strike off alternately during the play of the hole.

The players who are to strike against each other shall be named at starting, and shall continue in the same order during the match.

The player who shall play first on each side shall be named by his own side.

6. If a player shall play when his partner should have done so, his side shall lose the hole, except in case of the tee shot, when the stroke shall be recalled at the option of the opponents.

7. The side winning a hole shall lead in starting for the next hole, and may recall the opponent's stroke should he play out of order. This privilege is called the "honor."

8. One round of the links, generally eighteen holes, is a match, unless otherwise agreed upon. The match is won by the side which gets more holes ahead than there remain holes to be played, or by the side winning the last hole when the match was all even at the second last hole.

9. After the balls are struck from the tee, the ball furthest from the hole to which the parties are playing shall be played first, except as otherwise provided for in the Rules.

10. Unless with the opponent's consent, a ball struck from the tee shall not be changed, touched, nor moved before the hole is played out, except as otherwise provided for in the Rules.

11. In playing through the green, all loose impediments within a club length of a ball, which is not lying in

or touching a hazard, may be removed.

Ice, snow, and hail within a club length of the ball through the green may be removed; but on the putting green it may only be removed as provided in Rule 34.

12. Before striking at the ball the player shall not move, bend, nor break anything fixed or growing near the ball, except in the act of placing his feet on the ground and in soling his club.

13. A ball stuck fast in wet ground or sand may be taken out and replaced loosely in the hole which it has made.

14. When a ball lies in or touches a hazard, the club shall not touch the ground, nor shall anything be touched or moved before the player strikes at the ball.

The club shall not be soled, nor the surface of the ground be touched within a radius of a club length from the ball.

When a ball lies on turf in a hazard or surrounded by a hazard, it shall be considered as being on the fair green; *i. e.*, the club may be soled.

15. A hazard shall be any bunker of whatever nature—water, sand, loose earth, mole-hills, paths, roads of railways, whins, bushes, rushes, rabbit scrapes, fences, ditches, or anything which is not the ordinary green of the course, except sand blown onto the grass by wind or sprinkled on the grass for the preservation of the links, or snow or ice or bare patches on the course.

16. A player, or a player's caddie, shall not press down nor remove any irregularities of surface near the ball, except at the teeing ground, under the penalty of the loss of the hole.

"Near the ball" shall be considered within a club length.

17. If any vessel, wheelbarrow, tool, roller, grass-cutter, box, or other similar obstruction has been placed upon the course, such obstruction may be removed.

18. When a ball is completely cov-

ered with fog, bent, whins, etc., only so much shall be set aside as that the player may have a view of his ball before he plays, whether in a line with the hole or otherwise.

19. When the ball is to be dropped, the player shall drop it. He shall front the hole, stand erect behind the hazard, keep the spot from which the ball was lifted, or in the case of running water, the spot at which it entered, in a line between him and the hole, and drop the ball behind him from his head, standing as far behind the hazard as he may please.

The player must drop the ball himself, not his caddie nor his partner. A dropped ball shall not be considered in play until at rest.

20. When the balls in play lie within six inches of each other, the ball nearer the hole shall be lifted until the other is played, and shall then be placed as nearly as possible into its original position.

21. If a ball lie or be lost in water, the player may drop a ball under the penalty of one stroke.

22. Whatever happens by accident to a ball *in motion*, such as its being deflected or stopped by any agency outside of the match, or by the forecaddie, is a "rub of the green," and the ball shall be played from where it lies. Should a ball lodge in anything moving, such ball, or if it cannot be recovered, another ball, shall be dropped as nearly as possible at the spot where the object was when the ball lodged in it. But if a ball *at rest* be displaced by any agency outside of the match, the player shall drop it, or another ball, as nearly as possible at the spot where it lay. On the putting green the ball may be replaced by hand.

23. If a player's ball strike, or, be accidentally moved by an opponent or an opponent's caddie or clubs, the opponent loses the hole.

If the player's ball strike the other competitor or his caddie or clubs, it is a "rub of the green," and the ball shall be played from where it lies.

If a player's ball at rest be accidentally or intentionally moved by the other competitor or his caddie, the ball must be replaced.

24. If the player's ball strike or be stopped by himself or his partner or either of their caddies or clubs, or if, while in the act of playing, the player shall strike the ball twice, his side loses the hole.

25. If the player, when not making a stroke, or his partner or either of their caddies, touch their side's ball, except at the tee, so as to move it, or by touching anything cause it to move, the penalty is one stroke.

Except at the tee, if the ball move while the player is addressing it, the player loses one stroke.

Except at the tee, if the ball be struck while moving, the penalty is one stroke; *i. e.*, one stroke for the moving and one stroke for the play.

Except at the tee, if struck at while moving and missed, one stroke shall be counted for the moving and another for the miss.

26. A ball is considered to have been moved if it leaves its original position in the least degree and stops in another.

27. A player's side loses a stroke if he play the opponent's ball, unless: (1) the opponent then play the player's ball, whereby the penalty is canceled, and the hole must be played out with the balls thus exchanged; or (2) the mistake occur through wrong information given by the opponent, in which case, the mistake, if discovered before the opponent has played, must be rectified by placing a ball as nearly as possible where the opponent's ball lay.

28. If a ball be lost, and be not found within five minutes, the player's side loses the hole.

Where both balls are lost at the same time, neither side wins the hole, which should be called halved, irrespective of the number of strokes that either side may have played.

29. A ball must be played wherever it lies, or the hole given up,

except as otherwise provided for in the Rules.

30. The term "putting green" shall mean the ground within twenty yards of the hole, excepting hazards.

31. All loose impediments may be removed from the putting green, except the opponent's ball, when at a greater distance from the player's than six inches.

32. In a match of three or more sides, a ball in any degree lying between the player and the hole must be lifted, or, if on the putting green, holed out.

33. When the ball is on the putting green, no mark shall be placed nor line drawn as a guide.

The player may have his own or his partner's caddie to stand at the hole, but none of the players, nor their caddies, may move so as to shield the ball from or expose it to the wind.

34. The player or his caddie may remove (but not press down) sand, worm casts, or snow lying around the hole or on the line of his put. This shall be done by brushing lightly with the hand only across the put and not along it. Dung may be removed to a side by an iron club, but the club must not be laid down with more than its own weight.

35. Either side is entitled to have the flag stick removed, when approaching the hole. If a ball rest against the flag stick when in the hole, the player shall be entitled to remove the stick, and if the ball fall in, it shall be considered as holed out in the previous stroke.

36. A player shall not play until the opponent's ball shall have ceased to roll, under the penalty of one stroke. Should the player's ball knock in the opponent's ball, the latter shall be counted as holed out in the previous stroke. If, in playing, the player's ball displace the opponent's ball, the opponent shall have the option of replacing it.

A player having holed out his ball in the like or the odd, may knock away the opponent's ball from the

lip of the hole, and claim the hole, if he had holed in the like, or a half if he had holed in the odd.

37. A player shall not ask for advice, nor be knowingly advised about the game by word, look, or gesture from anyone except his own caddie or his partner or partner's caddie, under the penalty of the loss of the hole.

38. If a ball split into separate pieces, another ball may be put down where the largest portion lies; or if two pieces are apparently of equal size, it may be put where either piece lies, at the option of the player. If a ball crack, or become unplayable, the player may change it on intimating his intention to his opponent.

39. A penalty stroke (a stroke added to the score of a side for infringing rules) shall not be counted the stroke of a player, and shall not affect the rotation of the play.

History. Golf is a Scotch game, and is derived from the same sources as SHINNY and POLO. It is a great favorite in Scotland, and has been called the national game of that country. It became popular in England and her colonies long ago, but it was almost unknown in this country, except among natives of Scotland, till about 1890, after which it gained rapidly in favor, and about 1895 became a very fashionable sport. The United States Golf Association now includes nearly one hundred clubs.

As early as 1457 Golf was forbidden by law, lest it should interfere with Archery, but in 1744 the city of Edinburgh voted a silver club to be played for every year. Charles I. of England was fond of the game, and James II. was expert at it. The word Golf is derived from the Dutch *Kolf*, a club. It is pronounced *goff* and sometimes spelled that way.

GOING TO JERUSALEM, a game in which the players sit at first in two rows of chairs placed closely back to back in the middle of a room. A march is played on the

pianoforte, or some one not in the game may sing or whistle. As soon as the music begins, all rise and march in line around the chairs. While they are marching, some one who is not playing takes away one chair from the end of the line. The music stops suddenly, and all who can do so, sit down. Of course one player is left standing, as one chair has been taken away; and that player is out of the game. The music begins again, and the game goes on, a new chair being taken away each time until only one player is left. He is said to "get to Jerusalem."

RULES OF THE GAME.

1. No one must touch a chair while marching, on penalty of being put out of the game.

2. If two players sit on the same chair at once, the umpire shall decide which has the right to it, and in case of doubt may order the players to march again.

3. The person who removes the chair shall act as umpire.

History. This game is known also as "Musical Fright."

In England it is sometimes called "The Watchman," but instead of marching to music, and seating themselves when it stops, the players choose a captain or "fugleman," and follow him about the room, repeating the lines,

"The Watchman comes, beware, beware!
He'll spy us, if we don't take care."

The other players imitate the leader's movements and when he seats himself they all do likewise. Sometimes when only three players are left, the game is ended by holding a mock trial in which they are the accused.

GOOD FAT HEN, A. See REPEATING GAMES.

GRABOUQE, a game of CARDS played by four persons, two against two, with 12 full packs. The dealer deals to each player 21 cards, one at a time, which are piled face upward

at each player's right, to form what are called "Desperation Piles." The rest of the cards are divided equally among the players, and are placed in piles, face downward. The one who has the lowest card on the top of his Desperation Pile begins to play, and the others follow in regular order to the left. Each, in playing, turns up five cards, one by one, from those that are back upward, and lays them in four piles before him, face upward. As fast as the Aces appear they are laid in the centre of the table, and on them the Twos, Threes, and so on, are placed in order, without regard to suit. He who puts on the King takes the trick. Besides the five cards turned up by each, the top card of his Desperation Pile, or any exposed card of his four piles, may be used by any player, to put on the packs in the centre of the table, and his partner also may assist, where it can be done without turning up a card. Each trick counts one to the side taking it. If any Desperation Pile remain after all the others have been used, every card in it counts one to the opposite side.

GRACE HOOPS, or GRACES, a game played by any number of persons (each of whom has two sticks about four feet long) with wooden rings or hoops from 12 to 18 inches in diameter. A player, holding a stick firmly in each hand, places the hoop over them, crosses them, and then draws them quickly apart, thus sending the hoop into the air towards another player, who catches it on his sticks; and the sport thus goes on, each player receiving the hoop in turn. More than one hoop can be kept in the air if the players are expert. It may be agreed that when a miss is made it shall be scored against the person missing, and that at the end of a certain time the one having the fewest misses shall be winner of the game. Or, each player may have a hoop,

tossing it up and catching it again on his own sticks, in which case he

board. The players take turns, standing at whatever distance from the peg may be agreed on beforehand (usually about 15 feet), and each throws all the rings, one by one, before the next one's turn. He who throws the greatest number of rings over the peg wins the game. The players may throw each for himself or may be divided into sides,

Grace Hoops and Sticks.

who can do so the longest time, without a miss, wins.

The Grace Hoops sold at toy stores are usually covered with velvet or colored cloth. The Germans call this game *Reifenwerfen* (Ring-throwing) and each player has but one stick. In France it is called *Les Graces* (The Graces), as with us, because when skilfully played it is a graceful sport.

GRAND MUFTI, THE, a game played by any number of persons, all of whom form a ring, excepting the Grand Mufti, who stands in the middle. The Grand Mufti strikes an attitude or makes a ridiculous gesture, saying at the same time either, "Thus says the Grand Mufti," or "So says the Grand Mufti." If the former, each of the other players must imitate him; if the latter, no one must move. Any one that imitates the Grand Mufti when he should not, or fails to do so when he should, must change places with him. If two or more thus break the rules the Grand Mufti selects one of them to take his place.

GROMMETS, or RING TOSS, a game played by any number of persons, who try to throw rings over an upright peg. The rings, ten in number, may be made of wood or of tarred rope covered with cloth, and are usually about five inches in diameter. The peg, which is about 12 inches long, may be driven into the ground, or fastened to a base-

and each may have two or more turns as agreed upon beforehand. Grommet is a word used by sailors to mean a ring of rope, and the game was first played on shipboard. When more than one stake is used, as is sometimes the case, they are given different values, and sometimes they are fixed on a board which can be placed on the floor or raised at an angle. Several different forms of the game are to be bought at toy stores, some of which are called Pitchette.

GUESSING THE SIGN, a game played by any number of persons, two of whom are chosen to act as questioner and guesser. These two retire from the room and agree on a secret sign. The players select any object in the room and after telling the questioner what it is, call in the guesser. The questioner then names any number of objects, one at a time, and by giving the secret sign at the proper moment, enables the guesser to tell the one chosen. The company must guess what the sign is, and when that has been done, the player who guesses it takes the place of the one from whom he guessed it. The game must be repeated as often as the company desires, using the same sign, either till it is guessed or till the company gives up trying to do so, when the two that know it may tell it or not, as they please.

The simplest signs are motions of

the hands or body, or changes in the tone of voice, made by the questioner as he names the object chosen; but these are usually guessed in a few trials. An ingenious questioner and guesser will often invent a sign that can be guessed only after playing the game several evenings. Several signs are given below as examples:

1. "The Black Art." The questioner always mentions some black object just before that which the company has chosen. Although this sign is so simple, it is very puzzling to one who has never heard of it, nor any like it. It can be varied in many ways; for instance, the object chosen may be the first, second, or third after something white, something made of glass, or something worn by a particular person.

2. The object chosen and several others, usually not more than five or six in all, are placed in a row, and the questioner and guesser agree that they shall be thought of as numbered, either from right to left or left to right. The questions are also numbered in order, and are so asked that the object chosen is mentioned in the question that has the same number. Thus, suppose five objects are arranged in the following order:

a hat, a book, a glove, a handkerchief, a pen,

1 2 3 4 5

and that they are numbered as above in the minds of the questioner and guesser. The handkerchief is shown by the company. The questioner asks:

(1) "Is it the glove?" "No." (2) "The hat?" "No." (3) "The pen?" "No." (4) "The handkerchief?" "Yes." It will be seen that the guesser says "no" whenever the numbers of the question and object are different, and "yes" as soon as they coincide. The questioner must be careful, of course, not to make the numbers agree before he reaches the chosen object. It is still

more puzzling if the questioner simply points to the objects, without speaking a word. This sign is guessed by hardly more than one out of a hundred persons.

3. The questioner may say, "well" or "then" before one of his questions, agreeing that the object chosen shall be mentioned in a given number of questions after that.

4. The question may mention an object made of the same material as the one chosen directly before it. In this case he must be careful not to have an object follow one of the same material anywhere else in his questions.

5. "The Wizard of the East, or The Magic Stick." The questioner tells the company that the guesser will remain outside the room and yet tell the name of the person to whom... he points his stick. This is done by always pointing to the person who spoke last just before the guesser left the room. The questioner should encourage conversation. When the "Wizard" is shown as a parlor trick, as it frequently is, the questioner may pretend to perform magic incantations, and point in turn to several players, saying as he does so: "The Wand passes!" When he points to the one that spoke last before the guesser went out, he says, "The Wand rests!" and the guesser, who must be within hearing, instantly names the player indicated.

RULES OF THE GAME.

1. The sign must remain exactly the same till it has been guessed by the company. The slightest change, as altering the direction of numbering in example 2, is forbidden by this rule.

2. Any of the company may ask the questioner to put his questions under certain conditions, for instance with his eyes shut, or his hands behind his back. He must comply, but if he knows that the condition

would prevent giving the sign, he may simply say so without taking up time in the trial.

3. Any player who thinks he has guessed the sign, may take the place of the guesser to test his knowledge, for one or more trials, as the questioner may agree.

QUITAR, Experiments with. See **VIOLIN**.

GYMNASTICS properly include those exercises that are taken indoors for the purpose of developing the body. Outdoor exercises, such as walking, running, rowing, etc., are now called **ATHLETICS**, and the prominent idea in them is sport or recreation.

Gymnastic exercises are usually practised in specially arranged buildings called **gymnasiums**, because the association of many people together for exercise enables them to have more complete apparatus and the instruction of experts that could not otherwise be obtained. Gymnastic exercises have been classified as **Light** and **Heavy**, without regard to the amount of exertion required. Those exercises are called **Light** where no apparatus is used (**free gymnastics**), and where the exercise is obtained by moving the apparatus (**calisthenics**) as dumb-bells, wands, etc.

Heavy gymnastics are those exercises where the body is the resistance moved, the apparatus being fixed, as exercises on the horizontal and parallel bars, rowing, etc.

The exercises described in this article come chiefly under the head of **light gymnastics**. The more violent exercises are appropriate only for those who wish well developed muscles.

The regular practice of some of the gentler forms of gymnastics should be begun early in life, and more difficult movements taught as the child acquires strength.

The outdoor sports and games of children furnish enough exercise in **Heavy gymnastics** until the age of

twelve or fourteen years; but after that age, and especially in the winter, when the weather forbids outdoor sports, such as skating, some form of exercise that shall teach how to control and handle the body may well be undertaken.

Some exercises develop particular muscles or groups of muscles, while others develop nearly every muscle. Some exercises make the joints supple, while others tend to make them stiff. Some exercises make the muscle act slowly and powerfully, while others give swiftness and deftness without great strength.

Aside from the development of the muscles, gymnastic exercises are important to health, because they help the system to throw off waste material; and by improving the circulation they bring new material to all parts, so that growth is promoted, and each organ is better supplied with what it needs.

It is evident that the mind will get more recreation or rest from exercise if it is pleased or amused.

Therefore the gymnast must be interested in his work, and not merely exercise from a sense of duty. This is the reason why games like **Base-ball** or **Tennis** often do more good than a regular system of exercise. **Gymnastics** are made amusing in various ways. The feats on the horizontal bar and similar ones are entertaining in themselves, because they give an exhibition of both strength and skill that is reassuring to the performer, and make him feel that he can do something that not many others can do, and we all like to excel in something. The more monotonous movements, like those with dumb-bells, etc., are often made interesting by being performed by a large number of persons at once accompanied by music. When performed by one person alone, it is a good plan to whistle or sing or count, making the motions in time. Where a motion is to be repeated over from ten to twenty times,

counting grows very tiresome ; but if the performer takes notice of the part of the tune where he must change from one motion to another, he need not count at all, so long as he keeps time.

Gymnastic exercises, to be of benefit, should be performed regularly, the simpler kinds daily.

A short rest should be taken after each group or series of movements, especially if the heart has been made to beat rapidly. Some slow exercises can be taken at the end of a series that will tend to make the heart beat more slowly before actual rest begins, as it is not a good plan to begin or stop violent exercise suddenly. The exercise should only be continued until the gymnast is slightly fatigued and never until he is tired. One set of muscles may be weaker than others and hence tire sooner ; but this should never be an excuse for not giving the weak parts the most attention and exercise. The work should simply be made lighter.

The best time for exercise depends on the occupation of the person. For children at school the best time is at an intermission, in order to give mental rest by the change. For those persons who can control their time as they wish, the morning hours from ten to twelve, if the midday meal is eaten at 1 o'clock, are best ; but for those who are obliged to keep still all day, the evening from eight to ten o'clock is preferable to any hour before seven in the morning. Gymnastic work should not be done just before or after meals, because then the blood is needed at the stomach, and the tendency of the system is to send it to the surface more freely during and after exercise. Sleep may be delayed by too vigorous exercise immediately before retiring, so a short period of rest and amusement should follow, so that the excitement of the heart will subside, and the gymnast will sleep soundly.

Costume. The best dress for a gymnast is a pair of easy-fitting white flannel trousers, a gauze undershirt from which the sleeves have been cut, and a pair of canvas shoes without heels. He should also have a knit "sweater," or a blanket-coat, reaching well down to the heels to put on while resting, or after exercise while waiting for a rub-down.

A belt should not be worn, as it prevents free action of the abdominal muscles and hinders digestion. The same may be said of corsets. The dress of girls should be loose enough to avoid any restraint of action. The divided skirt is preferable for heavy gymnastics.

Free Exercises are movements without any apparatus. They are of many kinds, but only a few are described here. In addition to those given below, the ones given farther on as dumb-bell exercises may be made free by performing them without the dumb-bells.

1. Turn the head slowly alternately to the right and left, looking over each shoulder.

2. Bend the head forward and backward steadily, and then from side to side.

3. Rotate the head, bending it forward, to the left, back, and to the right.

4. The reverse of No. 3. (These four exercises strengthen the muscles of the throat and neck.)

5. With the hands on the hips, or outstretched, and without moving the feet, twist the body as far as possible to the right and left, alternately. The head must move with the body, but not independently of it.

6. With the hands on the hips, bend the body forward and back, and from side to side, and then rotate it as the head was rotated in exercise 3.

7. Raise and lower the shoulders.

8. Bend the elbows and move them, together with the shoulders, forward and backward.

9. Raise the body up as far as possible by standing on tiptoe.

10. Raise the toes high as possible, standing on the heels.

11. Raise the thigh up against the abdomen on alternate sides by bending the leg.

12. Raise the heel up to the buttock on alternate sides.

13. Stretch the arms in front, palms together, and throw them as far back as possible, on the same level, keeping the body erect.

14. Clenching the fists, as the arms are held at the sides, lift them suddenly till they are extended straight forward. Return them in like manner.

15. Raising the fists to the shoulders, extend the arms quickly straight upwards. Return in the same manner.

16. Extend the arms on each side, palms up, and bend the elbows till the tips of the fingers touch the shoulders.

17. Standing with legs a little apart, and arms hanging in front, describe circles with the fists, using each arm in turn, and keeping them perfectly straight. First describe each circle to the right, then both to the left, then one to the right and the other to the left.

18. With the hands on the hips, raise each leg in turn, so that it is at right angles with the body. Keep both legs straight.

19. In addition to the preceding, swing the leg backward as far as possible, keeping the body upright.

20. With the knee raised, throw the leg straight out in front, and then bring it to the ground.

21. Sit down slowly till the thighs touch the calves.

22. Lie on the back and raise the legs up to a perpendicular position.

Each exercise should be repeated a stated number of times, beginning perhaps with 10 and increasing to 25, and as rapidly as the gymnast is able. Such exercise may be made entertaining if it is performed by

several at once, keeping perfect time in their movements, with or without music.

Other free exercises are named from actions which they imitate, such as hewing, mowing, hashing, and chopping (see illustrations). The free exercises described are suitable for both boys and girls, and most of the exercises which follow under the heads of dumbbells, wands, and Indian clubs are also appropriate for girls, except



Mowing.

that the apparatus used should be lighter.

Wand Exercises. These require a straight smooth stick four feet long and three fourths of an inch in diameter. An ordinary broom-handle or cane can be used.

1. The wand is held in both hands, palms downward. The arms are first extended straight down, and then raised above the head without bending the elbows. The body is held erect throughout the movement.

2. The arms being held down as before, the wand is raised to the

chest by bending the elbows outward.

3. The arms are extended straight forward, and returned to the chest.

4. From the chest the arms are extended straight up and then brought down so that the wand rests on the shoulders behind the head.

5. The wand is held at the ends as in exercise No. 1, and then carried to the same position behind the back.

6. With the wand held straight above the head, the body is bent backward and then forward, keeping the knees unbent, and bringing the cane as near the floor as possible.

7. With the wand above the head as before, the body is bent as far as possible to the right and left.

8. With the wand above the head, the right arm is advanced and the left moved back, and *vice versa*.

9. With the arms extended forward, the body is turned to and from right to left, without moving the feet.

10. The wand is rested on the floor, both hands grasping the top, and the heels are raised from the ground so as to stand on tiptoe.

11. From the same position, keeping the heels above the floor, the gymnast sits so that his thighs rest on his calves, and then rises again.

12. The wand extended downward is touched to the floor by stooping, and then raised above the head.

The exercises just given call into play nearly all the muscles in the body. When they have been learned in proper order, each should be executed four times, as rapidly as possible. The number of times should be gradually increased to twenty-five.

Dumb-bell Exercises. A dumb-bell consists of two pieces of wood or metal nearly round like a ball connected by a bar long enough to form a good handle. The weight may vary from a few ounces up to a hundred pounds, but heavy dumb-bells

are only used for trials of strength and not for developing muscle. The ordinary weight is from one to six pounds.

The position for work with dumb-bells (see Fig. 1) is standing erect, with heels together and feet at an angle of about 60°, arms at the sides and a dumb-bell grasped firmly in each hand. Each movement is usually performed eight times. There are many movements, of which only a few are given here.

1. Move the bells out far enough to clear the thigh and twist the arms vigorously by turning the forward end of the bell outward, then inward as far as possible.

2. Stand as before, and bend the arm from the elbow till the forearms are extended straight forward. Then twist the bells as before.

3. Keeping the arms straight, raise them forward from the sides till they are on a level with the shoulders, and then twist as before.

4. Draw the elbows to the sides, and double the arms so as to bring the bells to the shoulders.

5. Bring up the bells as in the last exercise, and then carry them up until the arms are extended vertically. Then twist as in the first exercise.

6. Bring the bells to the shoulder, extend the arms to the right and left, and twist as before.

7. Bring the bells up under the armpits as far as possible.

8. Bring the bells to the armpit, and then thrust them out to sides.

9. Bring the bells to the armpit, and then thrust the arms straight up.

10. Repeat No. 8, bringing the bells down to the chest and then to the first position.

Dumb-bells.
Fig. 1.

11. Repeat No. 9, carrying the bells down to the shoulders, then straight out to each side, back to the chest, and down.

12. Repeat No. 9, and then bring them down together as near as possible to the toes, with a sweep, bending the body and keeping legs straight at knee.

13. Repeat No. 12, stoop, and recover to first position. Then take a long step forward with the right foot, keeping the left leg straight and the left arm parallel with it, but extending the right arm so as to form nearly a straight line with the left. Then bend the extended arm, bringing the bell to the shoulder, and repeat. Practise the extension about ten times, stretching the arm well out and holding the trunk straight. The exercise is then repeated with left leg and arm advanced, and then both arms are ad-



Dumb-bells.—Fig. 2.

vanced (Fig. 2), first with the right leg and then with the left.

14. Keeping the arms straight, bring them up to the horizontal position at the sides; then swing them around in front until they touch, then let them fall to sides. Then reverse the movement.

15. Swing the bells up in front until the arms are horizontal, then sweep them apart and back as far as possible, then raise them up until

the bells strike overhead, then bring them to the chest, etc., bring the bells to the chest. This and the preceding exercise should be repeated, first taking a step forward with the right foot and then one with the left foot.

16. Bring the bells to the armpits, then carry them straight up, and twist the body to the left as far as possible without moving the legs. In this position bring the bells to the chest, and lift and lower them ten times or more. Repeat, twisted to the left.

17. Raise the bells overhead and then sink till the calves touch the thighs (Fig. 3). In this position, go through as many of the simple exercises as desired, rising and falling again after each exercise.

18. Sit as before, but as the body sinks, the bells must be brought to the chest. Then extend the arms horizontally to the sides, and sweep them around to the front till the bells strike. Recover to the chest.

Apparatus for Heavy Gymnastics. Some of the more common and useful pieces of ap-

Dumb-bells.

Fig. 3.

paratus found in every gymnasium, with the exercises easily performed on each are as follows:

1. The Horizontal Bar is a bar of hickory, or other hard and tough wood, about six feet long and one and three-quarter inches in diameter.

It is usually strengthened by a steel cord and can be adjusted to any height by sliding up or down in grooves in the upright posts to which it is fastened at each end.

Horizontal bars of this form are used for vaulting or jumping by grasping the bar firmly with the hands and using the arms to assist in carrying the body up and over the bar. The modern method of suspending the bar is by iron posts resting on the floor and held firm by guys of copper wire, or by hanging all from the ceiling. The advantage of this form of support is that the bar can be easily removed and leave the floor free, and the bar is held much firmer when in place.

The bar should be kept clean by wiping frequently with a dry cloth, especially when the hands are sweating freely. Powdered rosin should never be used on the bar, as it makes the bar sticky, and blisters or pulls the skin from the palms in the difficult movements.

The first exercise on this bar may be to jump up to it, catching it with the hands so as to hang at full length. The bar should be placed at such a height that the feet will clear the



Horizontal Bar.

Fig. 1.

ground. Some gymnasts hold the bar with the thumb on the opposite side from the fingers, and some with it on the same side. While hanging at full length, draw the body steadily up till the chin is above the bar (Fig. 1), and then lower it slowly until it hangs again at full length.

This feat should be practised till it can be done several times in succession. The learner should now practise hanging by each hand alternately, then "walking" along the bar, hand over hand, and then swinging the body backward and forward till he can bring it up almost into a horizontal position.

To get on the bar (Fig. 2), the

body is raised till the chin is above the bar, and then the right side is allowed to fall while the left leg



Horizontal Bar.—Fig. 2.

is raised, bending the knee, and thrown over the bar. The right leg is then swung back and forth till sufficient impetus is gained to

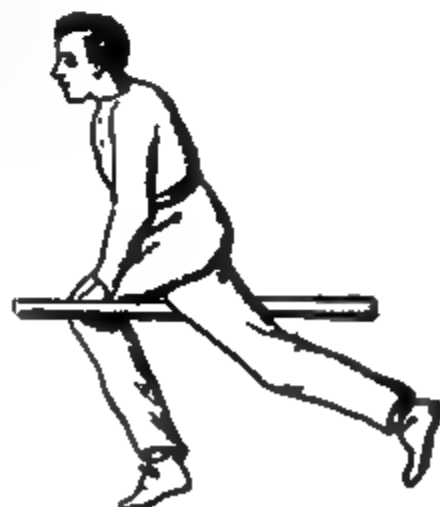
aid the gymnast in bringing himself upright above the bar which passes between his legs (Fig. 3).

In this position he should practise swinging, first backward and then forward around the bar, ending each time in the upright position.

Horizontal Bar.

Fig. 3.

In the backward swing (Fig. 4), which is the easier, the hands should be in front, and



Horizontal Bar.—Fig. 4.

in the forward swing (Fig. 5), behind the bar. In each, the arms

should be kept straight and the body erect, and the swing should be begun with sufficient impetus to carry the body entirely around the bar. In this movement the left leg is kept well fixed and the bar rests at about the middle of the thigh.

2

The learner may now throw the right leg also over the bar, and learn to balance himself on it in

Horizontal Bar.

Fig. 5.

various sitting positions without holding by his hands. The sitting



Horizontal Bar.—Fig. 6.

swings, backward (Figs. 6-7) and forward (Figs. 8-9), should now be tried. These are more difficult than the swings just described, because the weight is thrown entirely on the arms, except when the gymnast is above the bar, whereas before he hung on one leg. The sitting swings will require much practice, the chief difficulty being in getting quite

Horizontal Bar.

Fig. 7.

around into the sitting posture again. If this cannot be done, the gymnast should drop to the ground and then get on the bar again. If, while sit-

Horizontal Bar.—Fig. 8.

ting on the bar, the learner throws himself backward as if to swing, but unclasps his hands and bends his knees, he will hang by his legs, head downward. He may then swing backward and forward till he is high enough to straighten his legs and come to the ground on his feet.

Horizontal Bar.—Fig. 9. **Hanging or Trapeze Bar**, a bar similar to a horizontal bar, but hanging by two ropes like a swing. The same feats may be performed on it, but with more difficulty, since it is not fixed.

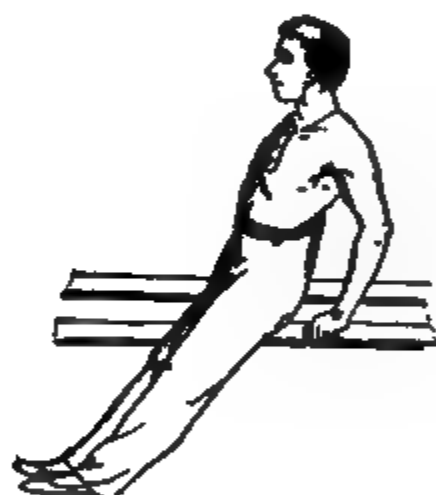
Parallel Bars, two bars supported on posts side by side. They should be from four and a half to five feet high, from 16 to 19 inches apart, and more than two inches in diameter. The bars are sometimes oval and sometimes round.

The gymnast must first practise supporting the weight of his body



Parallel Bars.—Fig. 1.

with a hand on each bar, the arms being held straight down, and he



Parallel Bars.—Fig. 2.

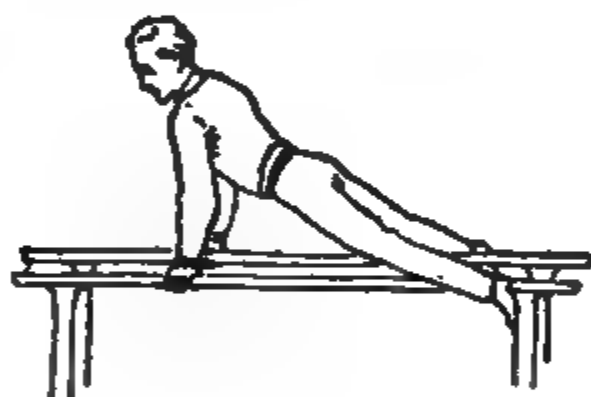
should then "walk" along the bars, taking a step alternately with each

hand. Then the body is allowed to drop a little, the bent elbows point-



Parallel Bars.—Fig. 4.

ing backward on a level with the shoulders (Fig. 1), and he should



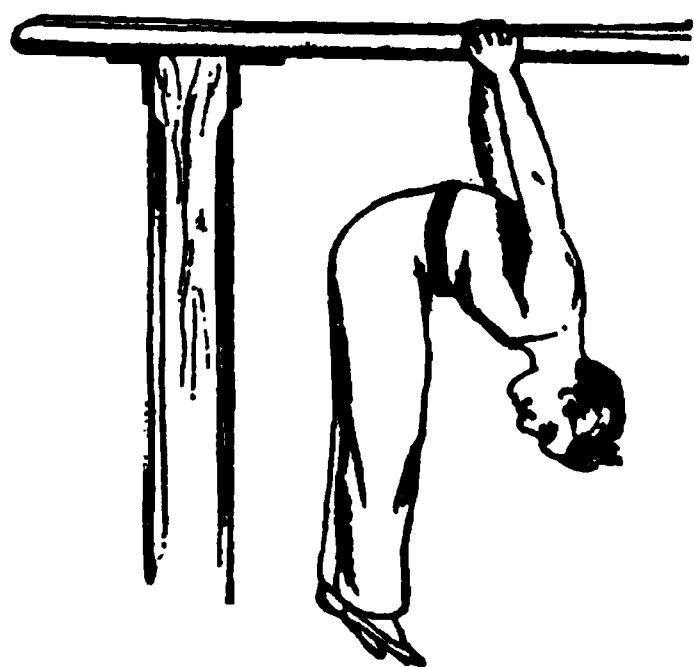
Parallel Bars.—Fig. 5.

advance by jumps, both hands striking the bars at once. This move-

Parallel Bars.—Fig. 3.

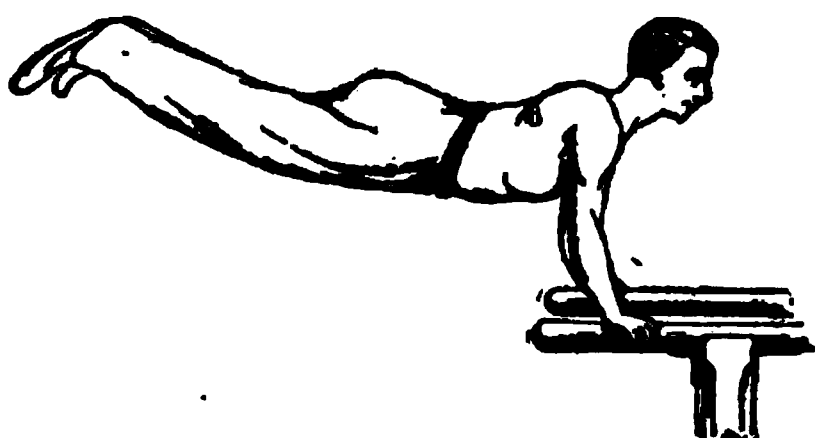
Parallel Bars.—Fig. 6.

ment is aided by drawing the feet up and kicking down with them at the instant of jumping. Then, supporting the body near the centre of the bars, as at first, the gymnast swings back and forth, and then throws his legs over one of the bars in front of him (Fig. 2). Return-



Parallel Bars.—Fig. 7.

ing to his original position, he next throws them over the same bar behind him (Fig. 3), and repeats these exercises with the other bar. One leg is then thrown to each side in front, so that the learner is astride

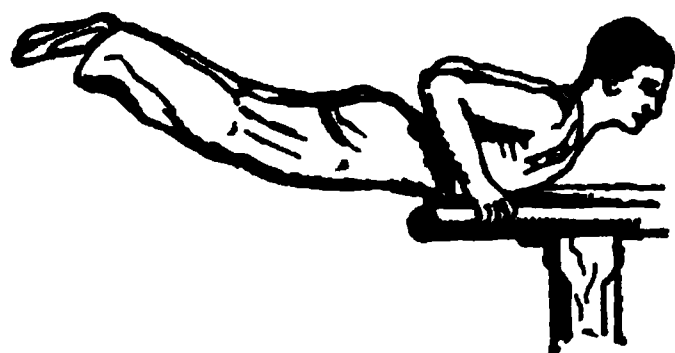


Parallel Bars.—Fig. 8.

of both bars at once (Fig. 4). This is also done behind (Fig. 5). The last few exercises may be combined in various ways, and performed swiftly.

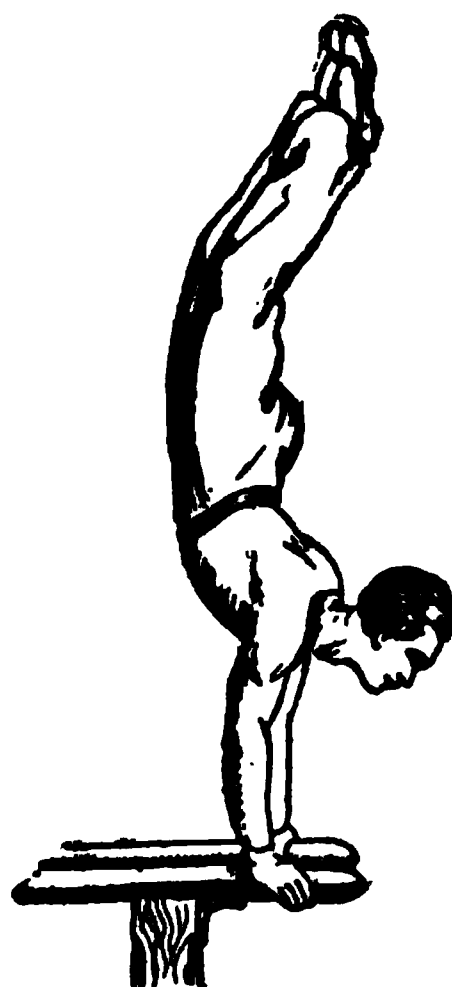
The gymnast next stands between the bars, seizes them with his hands on the outside, and then raises his

legs in front till the body is inverted the head hanging directly down and the legs projecting straight upward (Fig. 6); then the movement is, continued till the legs hang down on the other side, the hand still holding the bar behind the gym-



Parallel Bars.—Fig. 9.

nast's back (Fig 7). He should then return without touching the ground with his feet.



Parallel Bars.—Fig. 10.

Another exercise on the parallel bars is called Pumping or Dipping. The learner first swings back and forth, his arms being straight, till he can bring himself up into a horizontal position, facing downward (Fig. 8). Then while in this position

Vaulting Horse.—Fig. 1.

he bends his elbows (Fig. 9), and thus swings forward. When he comes back again he straightens out his arms and brings himself into a vertical position, his feet being high in the air (Fig. 10). As he swings forward he bends his elbows again as he passes the horizontal position, and so he goes on as long as he wishes.

The Vaulting Horse, a large block of wood, rounded at the top

Vaulting Horse.
Fig. 2.Vaulting Horse.—Fig. 3.
to resemble somewhat a horse's

back, and covered with leather. Two pommels, fixed in the back to



Vaulting Horse.—Fig. 4.

represent those of a saddle, are so made that they can be removed if necessary. The first exercise on the "horse" is to place one hand on each pommel and jump astride it, but without touching it, the weight being supported by the arms (Fig. 1). The forward leg is now withdrawn over the horse, and then the rear one is advanced, without touching the horse. Next the legs are changed in like manner, both at once, the body being still held up by the arms.

Vaulting Horse.
Fig. 5.

The learner next kneels on the horse between the pommels (Fig. 2) and then springs off (Fig. 3), landing upright with his feet on the ground. Next, bestriding the horse behind one of the pommels, facing it, and with a hand on each pommel, the (Fig. 4) gymnast throws his legs up and brings

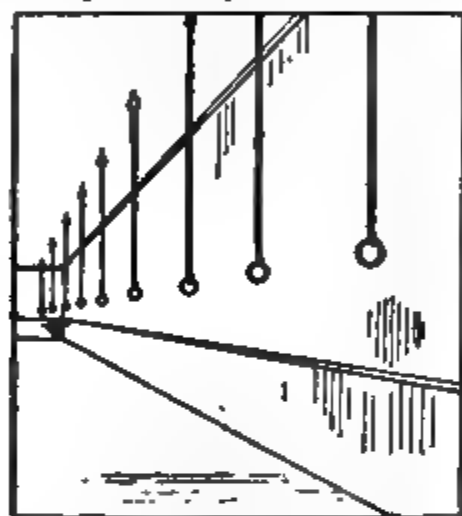


Vaulting Horse.—Fig. 6.

his body around so as to bestride the horse behind the other pommel.

The learner should next practise jumping over the horse with a hand on each pommel, starting with a run. First the legs should be brought between the hands (Fig. 5), and then outside of them (Fig. 6), letting go at the proper time.

Hanging Rings, Swing Rings, or Travelling Rings, are iron rings covered with leather or rubber, and each suspended by a rope (See illus-



Hanging Rings.

tration). Sometimes several are hung in a row, and the gymnast beginning at one end, takes the first ring, swings himself to the second, grasps that, and lets go of the first, after drawing back with it, and so on down the whole line.

Many feats may be performed with a pair of these rings. Taking one in each hand, the gymnast draws himself up till his chin is above them and then holds each alternately at arm's length, the other being close to the shoulder. Then both are held out together in the same manner and the body is allowed to sink slowly till it hangs at full length.

Another exercise is to swing to and fro, drawing up the body while ascending and letting it down while descending. By this means the height of each swing is increased. There are many other positions in swinging, which are easily found out,

such as with the elbows bent and the rings held close to the back. Many exercises similar to those on the horizontal and parallel bars can be performed on the rings also.

Rope and Pole Climbing. A rope for climbing should be securely fastened to a beam, if indoors, or the limb of a tree out of doors. The climber grasps the rope with both hands, one above the other, and crosses his feet, having the rope between them (Fig. 1). While the

hands pull the body up, the rope is allowed to slip between the feet; but the feet grasp it tightly, while the hands, one at a time, are raised to a new hold. The body is thus supported, first by both hands, then by the left hand and the feet, and lastly by the right hand and the feet. In descending, the feet are used as a brake to regulate the velocity, while the hands are lowered one past the other (Fig. 2). A pole is climbed in like manner, but the feat is more difficult, because the pole is thicker and rigid and therefore harder to grasp, than the rope, especially with the feet.

Rope-Climbing.
Fig. 1.

Ladders. These may be fixed horizontally, seven or eight feet above the ground, vertically or inclined at an angle. Often two are inclined together, forming an inverted V (Λ). These may be used both above and below, by ascending and descending with hands and feet, or hanging from the hands alone. After advancing one round at a time, the

Rope-Climbing.
Fig. 2.

learner should try to skip one or more rounds.

Lifting. This exercise should only be practised under the direction of an instructor, and then only by persons of mature age, with well developed muscles, especially the abdominal muscles, as rupture may be caused by the violent strain. Such violent exercises as lifting, TUG OF WAR, etc., have a tendency to check the development of the bones, and hence leave the person smaller than he might be at maturity.

By training the muscles carefully, and gradually increasing the amount lifted, athletes have been able to raise enormous weights. The greatest feats of lifting have been performed with a sort of harness passing over the shoulders. This was used by Dr. Winship, of Boston, who succeeded in lifting from the ground with it 2600 pounds. In lifting without a harness, the gymnast stands on a platform beneath which is the weight, furnished with two handles. The lifter grasps these, bends his legs slightly, straightens his back and arms, the shoulders being on a line with the feet and hips. The legs are then steadily straightened, the strain thus coming on every part. The weight is lifted but an inch or two. Sometimes the lifter is aided at first by a spring on which the weight rests. Some of the best lifting feats are recorded in the appendix.

The chest weights, or "pulley weights," are held in place by two parallel guide rods and fastened to a rope passing over a hinged pulley at height of the shoulder to the hand. They are made double for the purpose of exercising both sides at the same time.

This is the best single piece of apparatus that has yet been devised for general exercise. The weight is easily adjusted to the

strength of the person using it, and there is little danger of straining even a feeble person.

Exercises. 1. Standing facing the apparatus take a handle in each hand so that the hands will be about a foot from the pulleys when the arms are extended.

(a) Raise the arms up to a perpendicular position and return, repeating as many times as desirable.

(b) Spread the arms apart, and return as before.

(c) Lower the arms to the sides and return.

(d) Combine (a) and (c).

(e) Combine (a) and (c), bending over so as to bring the hands as near the toes as possible without bending the knees.

2. Standing with the side toward the apparatus, using one hand at a time, (a) raise the arm up to a perpendicular position beside the head and return.

(b) Sweep the arm around in front horizontally, keeping it stiff.

(c) Bring the arm down to the side.

(d) With the arm farthest from the machine, describe the horizontal movement similar to (b).

(e) With both hands together execute (b) and (d).

(f) With both hands execute (c), except that one arm is carried back of the body as far as possible, while the other sweeps by in front.

3. Standing with the back to the apparatus, many simple movements like those mentioned before can be executed. If the left arm be the weaker, the movements should be repeated more times with that side, or the weight made slightly heavier.

4. It will be seen that by putting the foot in the handle, as a stirrup, and balancing on the other leg, while executing movements with the first, a good amount of exercise will be given the legs and hips.

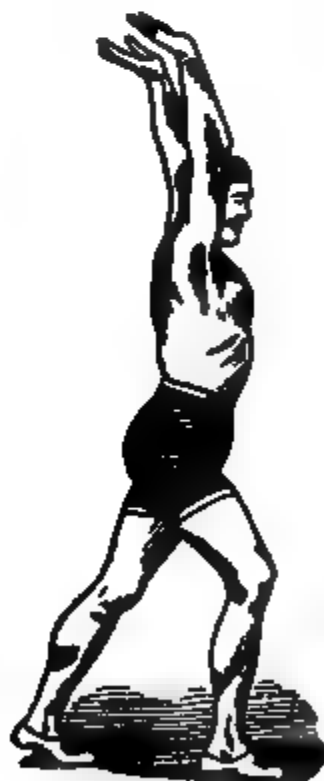
Tumbling. The various kinds of

tumbling, such as somersaults, hand-springs, lying on the ground and springing directly to a standing posture, depend largely on practice and can scarcely be taught in a book. They are performed chiefly by professional acrobats, but many amateurs attain great skill in them. Directions for only the simplest kinds are given.

The Backspring (Fig. 1). The

Tumbling.—Fig. 1.

gymnast lies on his back and places the palms of his hands flat on the ground above his head. Then,

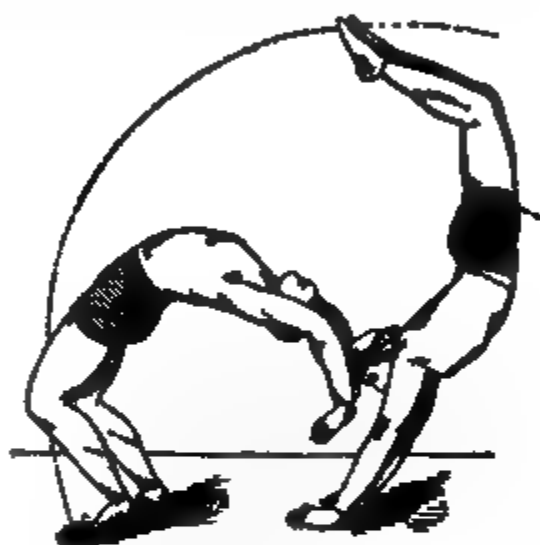


Tumbling.—Fig. 2.

raising the legs over the head, he gives a spring from the hands and shoulders, throwing his feet quickly

forward, and drawing the heels close to the buttock, the object being to come into a standing posture with a single effort. The hands should be brought forward when the feet are nearly on the ground, that the balance may be preserved.

Handspring. (Figs. 2 and 3) The gymnast stands erect, the right leg forward, and bending slightly backward raises his hands high above his head, palms up. He then springs forward, placing his hands



Tumbling.—Fig. 3.

on the ground, and throws his legs over, the left first. Just as the legs go over, he springs from his arms and lands upright on his feet.

Back Handspring (Fig. 4). The



Tumbling.—Fig. 4.

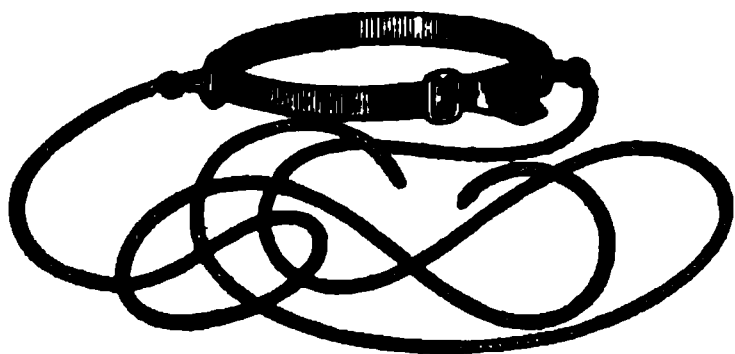
gymnast stands erect, his legs slightly apart and his arms raised above his head, elbows pointing to

the front and palms upward. He then bends down slightly, quickly throws arms and head back, bends the body backward, and at the same time throws his legs up over his head, pitches over on his hands, and springing from them alights on his feet.

Forward Somersault. The gymnast stands erect with arms above his head, and after a short run jumps up from both feet, throws the arms down, and the head and shoulders quickly forward, at the same time bending the knees, and turns completely over in the air, alighting on his feet. When the jump is made, he sometimes seizes the under part of the thighs, just above the knees, pulling them up to the body. This, which is called the "catch," assists the somersault.

Backward Somersault. The gymnast raises his arms, then brings them down with a quick sweep and raises them again, at the same instant with a spring throwing the legs over the head and catching the thighs, as described above.

All tumbling exercises require constant practice and great perseverance. To avoid dangerous falls, the gymnast should wear what are called "lungers" (Fig. 5), consist-



Tumbling.—Fig. 5. Lungers.

ing of a leather belt about an inch and a half wide, buckled around his waist. On each side of the belt are secured rings, to each of which a rope four feet long is tied. An assistant holds each rope while the gymnast is practising, and if he is in danger of a fall they can thus save him. The lungers are especially useful in giving the

learner a feeling of confidence, for since he knows he is in no danger of falling, he will be much bolder in his attempts. All the feats described above are performed on a thick mattress.

Special Apparatus. Modern gymnasiums are provided with all kinds of machines for developing special muscles. For instance, to strengthen the muscles of the neck, a pulley-weight is used like those already described, having a small semicircular net at the end of the rope. By placing this on the back of the head and lifting the weight by moving the head backward and forward, the muscles in the back of the neck are exercised, and by shifting its position the other neck muscles may be exercised in like manner. There are also machines to imitate special motions, such as rowing, canoe paddling, wrestling, and rope-climbing. The best gymnasiums now contain also dynamometers (from two Greek words meaning strength-measurers) for testing the muscles, spirometers (breath-measurers) for measuring the capacity of the lungs, and other arrangements to test the development of the gymnast.

Indian Club Swinging. Indian clubs are made of wood. Formerly they were sometimes weighted with lead, but this is wrong, as the exercise depends largely on the speed and combination of movements. The exercise is more for rendering the joints supple than for increasing the size of the muscles, though it does both; and swiftness and accuracy of movement should be aimed at rather than the exhibition of great strength. The number of movements possible with two clubs is almost numberless, and new ones can be invented by the learner, but all consist of combinations of three distinct motions called circles—the straight-arm circle, the bent-arm circle, and the wrist circle. In the first the club is swung around at arm's length; in the second the circle

is made with the arm well bent at the elbow, the shoulder being the centre, as in the straight-arm circle; and in the third the club is moved through a circle of which the hand is the centre. The third or wrist circles are made by the muscles of the forearm and hand.

All circles should be as near plane circles as possible, and the body held erect and firm while the clubs are in motion.

The swinger should be able to stand quite close to a wall without hitting it with the clubs while he is swinging. In beginning to swing, the learner should stand with heels

or backward, it is said to describe a forward or backward circle.

For convenience, all the swings of one kind are described together, but it is not necessary for the learner to master all of one kind before going to the next. A good order for the learner to follow is given below.

To perform the straight-arm circles, lift the club till it is held at arm's length, and then describe a circle toward the head for the inside circle, or toward the outside of the body for an outside circle (Fig. 2).



Indian Clubs.—Fig. 2.

It will be seen that all inside circles with the right hand are in the same direction as all outside circles with the left, and *vice versa*. When one circle is finished the club must always be brought down into the starting position before beginning the next. When the learner has

mastered the inside and outside straight-arm circles, with either hand, he should practise the bent-arm circles, which are those behind the back. Raising the club from the starting position, it is lifted over the head and allowed to drop down behind the head (Fig. 3) and shoulder, being

Indian Clubs.—Fig. 1.

together, leaning a little forward to throw the weight on the balls of the feet. He should begin with one club, holding it in what is called the starting position, with which every movement is begun and ended. In this position the club is held vertically in front of the shoulder, as shown in the dotted part of Fig. 1. All circles are called inside circles if the club moves first toward the swinger's head; if in the other direction they are outside circles. If the club moves directly forward

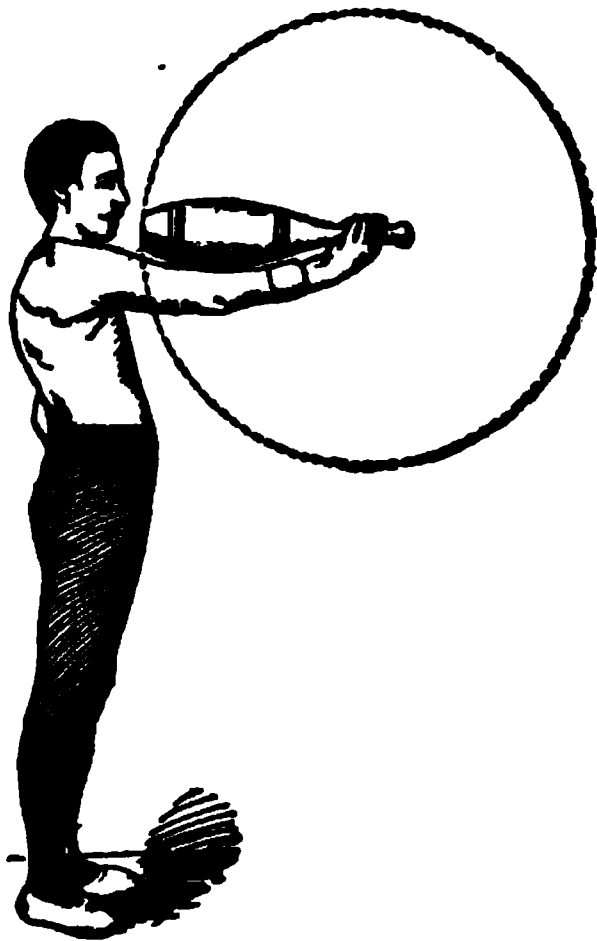


Indian Clubs.
Fig. 3.

head (Fig. 3)

brought up to position by rotating the wrist. This is the inside bent-arm circle. The outside circle is just the reverse, the club moving out from the shoulder (Fig. 1) and dropping, being then brought up behind the head by the wrist movement, and then coming to position.

Wrist Circles. These are executed with the arm in any position, as extended straight in front (Fig. 4), or toward one side, straight downward close to the body, or bent at the side. The club is held vertically

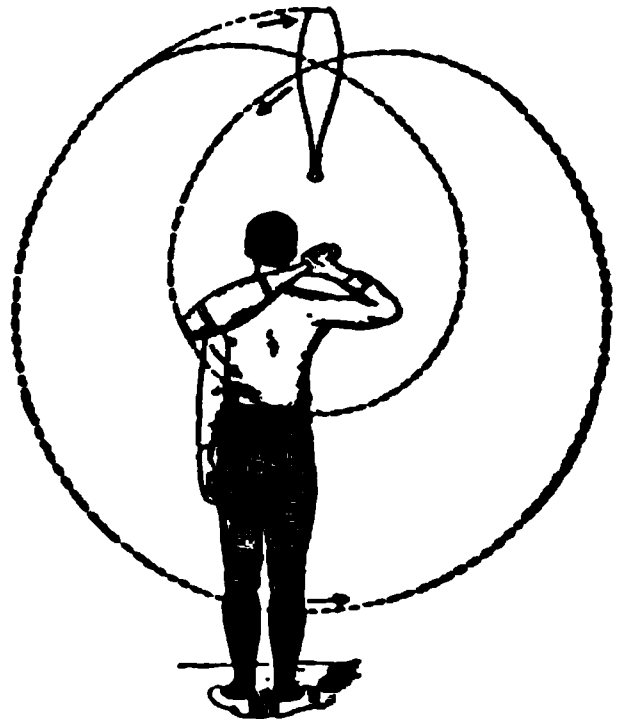


Indian Clubs.—Fig. 4.

in position at first, and then allowed to fall forward or backward. Its impetus, aided by an effort of the wrist, brings it upright again, thus completing the circle. The learner should try to perform each wrist circle several times without stopping. He should avoid the temptation to bend the elbow a little, and strive to hold the arm perfectly stiff. The distinction between inside and outside circles is the same as that given above, and besides this, every circle can be made on either side of the arm, so that for nearly every position of the arm there are four

wrist circles. All the circles described above should be learned by name, so that their combinations can be readily performed when named.

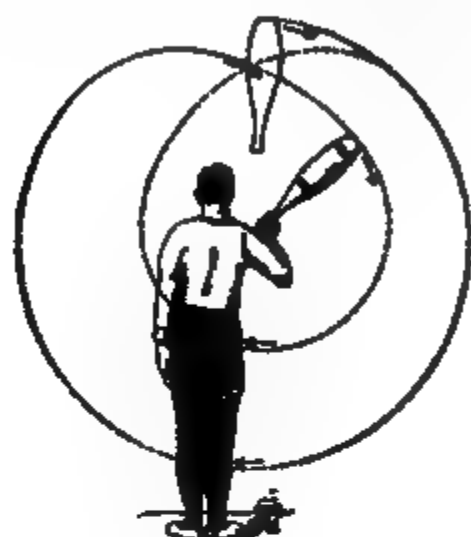
Combinations. The inside straight-arm circle and the inside bent arm circle behind the back are performed alternately (Fig. 5), passing di-



Indian Clubs.—Fig. 5.

rectly from one to the other, without bringing the club back to the starting position till the two swings have been made several times. The arm circle is made first, and when it is completed, as the club is held straight up at arm's length, it is dropped over the head into the inside bent-arm circle. On the completion of this, the arm is straightened again vertically, and the club moves on in another straight-arm circle. In the same way the outside straight-arm and bent-arm circles can be combined (Fig. 6). In combining the inside straight-arm with the outside bent-arm, or *vice versa*, the change from one to the other is best made at the extreme right and left points of the swing, passing the arm instead of the club over the head. Thus, neither circle is quite completed, and the club is not brought to a vertical position, till it is returned to the starting point. In like manner,

bent-arm and wrist circles and straight arm and wrist circles may be combined, or all three kinds together. The wrist circle may be introduced at any point of the



Indian Clubs.—Fig. 6.

swing, but the best place is when the arm is farthest from the body, as this gives plenty of room.

Combinations with both Clubs. Any of the simple or combined swings described can be performed with both clubs at once, or each club may execute a different circle. It is evident that if the two clubs describe the same circles at the same time, the clubs will move in the opposite direction, and will cross (Fig. 7).

Indian Clubs.—Fig. 7.

so that it requires skill to avoid striking them together. On the other hand, when one club executes an inside movement, and the other

the corresponding outside movement, the circles are in the same direction and the clubs move parallel



Indian Clubs.—Fig. 8.

to each other (Fig. 8). Instead of executing the same circle simultaneously, however, one arm may perform one kind of circle while the other is executing another (Fig. 9).



Indian Clubs.—Fig. 9.

Thus, where the movement consists of a straight-arm and bent-arm circle, the right hand may execute the former while the left is doing the latter, and *vice versa*. With this method there is never danger of the clubs striking, for when they cross one is in front of the swinger and one behind. In another way of swinging, one club follows the other, but half a circle behind, so that the clubs are not executing the same part of a circle at any moment. These are called "Follow" or "Windmill" movements.

It would be well for the novice in the art of club-swinging if he could receive personal instruction from some adept; but practice and work are what counts for most in gaining success in this, as in many other accomplishments. Then begin with the simple movements and practise them until they seem easy.

1. Straight-arm circles outside.
2. " " inside.
3. " " forward at side.
4. Straight-arm circles backward at side.
5. Bent-arm circles outside.
6. " " inside.
7. Wrist circles forward or inside.
8. " " backward or outside.

Follow these with the simplest combinations, and each day try something new. The left hand should by this time be as proficient as the right.

The following list of combinations may be a good order in which to learn new movements:

1. Combination of inside straight-arm and bent arm circles as already described.
2. Combination of outside straight-arm and bent-arm circles.
3. Double swing both clubs. Both clubs are held in the starting position, and then the right hand begins the inside straight-arm, while the left at the same time begins the inside bent-arm circles. These two circles are finished at the same instant, when the right takes up the bent-arm, and the left the straight-arm movement. The learner will probably find the use of the two clubs difficult at first, and the movements must be gone through with slowly until they become very familiar when the speed is increased.
4. Double swing. No. 2 with both hands, one arm doing the straight, and the other the bent-arm outside circle, as above.
5. No. 1 with the right, and No. 2

with the left, one doing the straight-arm while the other executes the bent-arm outside circle. The right begins with the inside straight, and the left with the outside bent.

6. No. 5 reversed; that is, No. 2 with the right, and No. 1 with the left.

7. No. 5 in parallel motion, that is, both hands doing the straight and both the bent-arm circles at the same time. Both hands begin with the straight-arm motion, the right with the inside and the left with the outside circle. The clubs should be kept at the same distance during the whole movement, so that they move in exactly parallel lines.

8. No. 6 in parallel motion.

9. No. 3 in cross motion, both hands starting on the inside straight-arm. The clubs cross, twice in front and twice behind and it will doubtless be found difficult at first to prevent them from striking. The proper way is to swing them in slightly different planes, and when each hand becomes accustomed to its own path, the movement can be executed almost mechanically without danger of the clubs interfering. It should be performed very slowly at first, and the clubs kept far apart in crossing.

10. No. 4 in cross motion, both clubs starting on the outside straight-arm circles.

11. No. 5 in "follow" or "windmill" motion. The right starts with the inside straight-arm, and just as it has half completed the circle, the left starts with the outside straight-arm. Thus the right club keeps half a circle ahead of the left, and when the movement is correctly done, they should always extend in opposite directions, one pointing up while the other is down, and one to the right while the other is to the left. Some swingers bring the clubs nearer together than this, making the movement more like one in parallel motion.

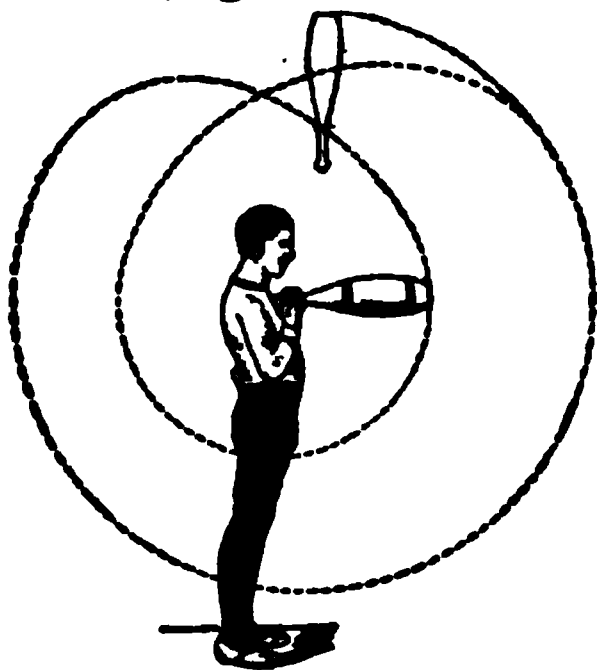
12. No. 6 in windmill motion.

In this the left hand leads off with the inside straight-arm circle, the right following with the outside. The left keeps half a circle ahead.

13. Wrist Circles. These may be introduced earlier if desired. All the simple wrist circles should be practised with the arms in various positions, first with one hand and then with both. Wrist circles may be substituted for the bent-arm circles in all the exercises given above. They may be introduced while the arm is extended to right or left, or with the arm bent so that the hand is close at the shoulder.

When the learner has proceeded thus far, he will be able to devise his own combinations.

All the combination movements described above have been to the right and left, the plane of motion being always parallel to the line toed by the swinger. Combinations of straight-arm circles forward and backward at the side (Nos. 3 and 4 of simple movements) may be readily combined with wrist circles at the side (Fig. 10) and make very



Indian Clubs.—Fig. 10.

effective movements for exercise.

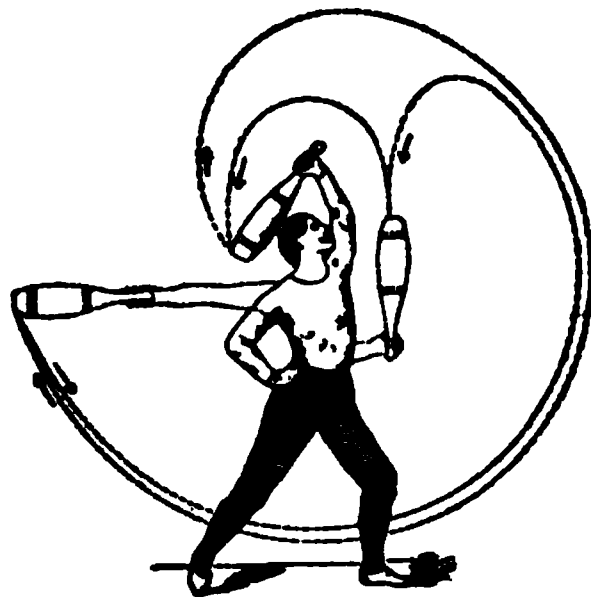
Descriptions of a few special swings will now be given.

Stop Swings. In these each club is brought down with a slap on the opposite arm, from which it rebounds, reversing the circle.

Turning Swing. This begins with one or more forward wrist swings,

outside the arm with both hands, and then one hand executes a forward bent-arm, while the other performs a forward straight-arm circle. At the same time the swinger turns half way around, always toward the hand which is doing the straight-arm circle, so that he finishes facing in the opposite direction, the arm describing the bent-arm circle having passed over his head as he turns. Several more wrist circles are then executed, and the gymnast turns back again in the same manner.

An exercise for a heavy club (Fig. 11) is to raise the club from the



Indian Clubs.—Fig. 11.

starting position, drop it over the head, and let it hang behind the shoulder. Then throw it over as if to strike, describing a forward straight-arm circle, and ending with the club extended horizontally behind the back. The club must then be carried back to the starting-point before repeating. A similar exercise with two clubs is to throw them over the shoulders, return to starting position, make bent-arm circles at the sides, and then a forward straight-arm to the horizontal position behind the back, as before. The clubs are then returned to the starting position. In these exercises, as in the others, the motion of the two clubs may be exactly alike, or the right hand may execute one part of the circle while the left is doing the other.

Feats of Club Swinging. On Feb. 18, 1886, at Bath, Me., Edward Brown swung a pair of Indian clubs, weighing 8 pounds, 1½ ounces each, continuously for 6 hours, 20 minutes.

On Jan. 7, 1885, at New Haven, Conn., W. W. Dudley swung 100 separate combinations each 4 times, in 23 minutes, 36 seconds.

Indian clubs are said to have been brought to England from Persia by an officer in the British army, but their origin is not known with certainty.

History. Systematic exercise has long been practised. In ancient Greece it formed part of the education of every boy, and was continued during manhood. The Greek games, which were largely exhibitions of skill in gymnastics, are described in C.P.P. Gymnastics were employed also, as with us, as a cure for disease, and finally they were taken charge of by government officers. Public gymnasiums were erected first in Sparta and then in Athens, where some of them became celebrated as the places in which great philosophers lectured to their pupils.

Among the exercises taught were dancing, leaping, pitching the discus or QUOIT, throwing the javelin and bar, riding, swimming, rowing, swinging, climbing, and archery. Gymnasiums in imitation of the Greeks were built also at Rome, but gymnastics never became popular there. In the middle ages gymnastics was represented by knightly exercise, such as the tournament, and among the lower classes by wrestling, running, and archery, but systematic training of the muscles was but little practised. In the 17th century it began again to be popular. The illustration shows a form of vaulting-horse in use at this period. In the 18th century there was a great gymnastic revival in Germany, and in 1810, when Prussia was under the rule of Napoleon, a

teacher named Jahn, with others, established throughout the country gymnastic schools, whose pupils did good work in the expulsion of the French in 1813. These schools were copied in nearly every country in Europe. From them sprang the

Ancient Vaulting-horse.

associations called *Turnvereine* (gymnastic societies), which were soon afterward suppressed by the Prussian government, which feared that they would spread liberal ideas. In 1848 they were reorganized, and now many of them exist in this country, where they have been formed by German emigrants. These societies have done much to make gymnastics popular in the United States, and they were aided by the interest the colleges have taken in the subject.

The finest gymnasiums in the United States are owned by the athletic societies, and the whole history of gymnastics is very closely connected with that of ATHLETICS. The two words are often used to mean almost the same thing.

The only exercises described under Athletics in this book are those which commonly form part of the outdoor or "field" meetings of athletic societies, while in this article we have described those usually practised in a gymnasium, or at home, for the sake of health.

H

HALEY-OVER, a game of ball played by any number of persons, divided into two opposing parties. The parties stand on opposite sides of a building, and one of the players throws a base-ball over the roof. The players on the other side try to catch the ball, and if any one succeeds he runs around the building and tries to hit one of his opponents with the ball, either by throwing it or running with it in hand. If any one is hit, he has to join the side of the hitter. If the ball is not caught, it is thrown back over the building in the same way as at first. When a ball has been thrown, those on the throwing side have no means of knowing whether it has been

caught or not until it either appears again over the roof, or in the hand of an opponent, running around the corner, hence every one must be on the lookout. The game lasts until all the players are on one side.

The name Haley-Over is probably from the old word hale, meaning to draw or drag, from the drawing over of the defeated player to the opposite side. The game is much played in some parts of New England.

HALLOWE'EN PARTY, an entertainment given on All Hallows Eve, or Hallowe'en, the night before All Saints' Day (Nov. 1). The amusements of this evening were supposed in ancient times to foretell



Fig. 1.

future events. Some of them are described below.

1. Each person, alone with a looking-glass in one hand and a candle in the other, walks down stairs backward into a dark cellar or basement. It was supposed that each would see in the glass the face of his or her future wife or husband.

Sometimes, instead of this, each runs around the outside of the house three times, with his mouth full of water.

2. Each person melts some lead in an iron spoon, and pours it through a wedding-ring or through a key (Fig. 1) into a vessel of water. The lead will cool in curious shapes,

which were supposed to be prophetic. Any one who is ingenious can cause much amusement by interpreting these shapes. For instance, if one of them looks like a shoe, it may be said that the owner will marry a shoemaker, or is going to have a pair of new shoes, or it may mean a wedding, as an old shoe is often thrown after newly-wedded couples "for good luck." Lead can easily be melted in any coal fire. Great care should be taken in pouring it through the ring or key, or serious burns may result.

3. Snap-dragons. These, which must be prepared before the party, consist of slips of paper with verses written on them. The slips are folded very small, and wrapped in lead or tin foil. They are then placed in a large dish, and covered with water, over which alcohol, or spirits, is poured and set on fire. While it is burning, each person in turn must snatch one of the snap-dragons from the dish. The verse he gets is supposed to tell his fortune. This furnishes much fun if the verses are written skilfully. The "dragons" should be placed in an earthen or tin-plate dish. Silver should not be used, as it melts too easily. The dish must be placed in the middle of a bare table, for drops of burning spirits are often splashed about, and great care must be taken that they set nothing on fire. In floating the alcohol on the water it should be poured on the side of the dish and allowed to flow down gently; otherwise the two liquids will mix.

4. Each person takes a greased needle and floats it in a basin of water. This requires some care, but can be done if the needle is put down evenly and gently. The best way is first to lay on the water a bit of very thin tissue-paper and place the needle on it. In a short time the paper will become wet and sink to the bottom, leaving the needle floating on the water. Owing

to a phenomenon called *capillarity*, the needles behave very curiously. Some run to the edge of the dish and stick there, while some rush together and cling together, avoiding others. The manner in which one person's needle behaves toward another's causes amusement, and may be supposed to be prophetic.

5. Bobbing for Apples. Apples are placed in a tub of water, and each in turn tries to pick one out with his teeth. Sometimes each apple is inscribed with a name, which is supposed to be that of the future husband or wife of the person who picks it out. Sometimes also each apple bears a letter, and each guest picks out two. The letters are supposed to be the initials of the guest's future husband or wife.

6. On a table are placed three dishes, one of clear water, one of soapy water, and one empty. Each guest is blindfolded, and after the positions of the dishes have been changed so that he does not know which is which, he advances and puts his finger into one. If it be the one of clear water, he will marry happily; if the soapy water, he will marry a widow; and if the empty one, he will not marry at all.

7. Nutshell Boats. These are made by pouring melted wax into halves of walnut-shells, in which are short strings for wicks. Several persons float these boats in a tub of water, after lighting the wicks, and the way in which they ride is supposed to show what the future life of the owner will be.

8. Kaling. Two persons are blindfolded and required to walk to the vegetable garden, where each pulls up the first cabbage-stalk he finds. From the shape of the stalk, the fortune of him who pulls it up is inferred. The dirt clinging to the roots represents wealth.

9. Apple and Candle.—At one end of a stick, about eighteen inches long, is fastened an apple, and at the other end a lighted candle (Fig. 2).

The stick is then suspended from the ceiling by a string fastened at its centre, and swung backward and

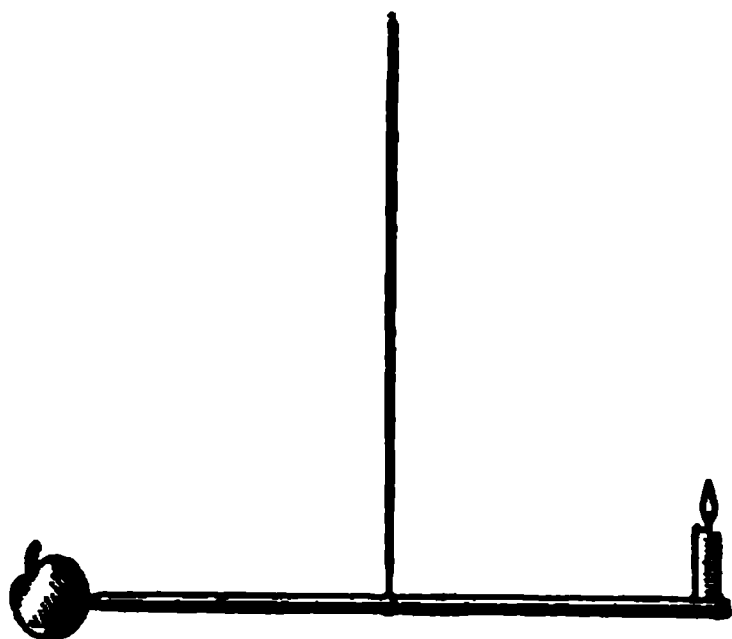


Fig. 2.

forward, while the players, one by one, try to catch the apple in their teeth.

10. The Raisin. A raisin is strung at the middle of a string or thread about a yard long, and two persons take each an end of the string in his mouth. Whoever, by chewing the string, reaches the raisin first, is allowed to eat it.

History. Superstitious persons believed in old times that spirits walked abroad on Hallowe'en, and that they would assist people to know the future by performing the feats, some of which are described above. Nobody believes this now, yet the feats are often performed for amusement on Hallowe'en. In some parts of England it is called "Nut-Crack Night," from the custom of eating nuts on that evening.

HALMA. See CHECKERS.

HAND-BALL, a game played by two or four persons with a small ball, which they strike with their hands against a wall. The game may be played in a court or room having walls on all four sides, or out-of-doors against the wall of a building. In the latter case lines are drawn on the wall and the ground to represent the side walls, and when a ball goes outside these lines it is supposed to have struck a side

wall. A board called the Back-board, or a line representing it, bounds the court on the fourth side, and a line, called the Ace Line, is drawn parallel to the front wall and Back-board half way between them. The two-handed game will be described first. The players toss up for the "first hand," and the winner stands inside the Ace Line, while his opponent stands outside of it. The former is called the striker and the latter the player. The striker begins the game by bounding the ball on the ground and then striking it with his hand so that it rebounds from the front wall. This is called a "service." The ball must be served so that it rebounds outside the Ace Line. If it does not, it is said to be a short service. If the striker make three successive short services, or if the ball bound on a side wall before striking the front wall, or if it bound outside the Back-board, it is a "hand-out," and the striker and player change places. If the striker serve the ball properly, it must be struck by the player with his hand, either before it strikes the ground or after the first bound, so that it bounds from the front wall. This is called a "return." If he fail to return it properly, the striker scores one point, called an ace. If he do return it, the striker must bound it again from the front wall, and if he fail, it is a hand-out. After the service, the ball may strike the ground anywhere in the court inside the Back-board. This goes on till the striker has scored or made a hand-out, when an inning is said to have been played. He and his opponent change places, and the latter becomes striker in his turn. After the first inning, an inning ends only when there is a hand-out, and the striker continues to serve after he scores. The player first making 21 aces wins the game. As will be seen by the rules, it is sometimes allowable to strike the ball with the

foot. When four play, two against two, the partners serve and receive alternately. During the service the strikers' partner stands with his back to the side wall or side line, but after the return all take part in the game.

RULES OF THE GAME.

1. If the striker or his partner stop the ball intentionally before it bounds after leaving the front wall, or while on its way to the front wall, it is a hand-out.

2. If a ball struck by the player strikes the striker or his partner, it shall be played over again.

3. When a ball is served short to the player he has the privilege of striking it with his hand or foot; if it is struck with the foot and fails to go upon the front wall, it does not score for the striker. If it is struck with the hand and fails to strike the front wall, it is an ace for the striker.

4. If a ball is served short to the player and he strikes it with his foot upon the front wall, the striker, after returning it on the wall, has the privilege of preventing the player from striking it again.

5. If a ball is struck with the foot and assisted by the hand on to the front wall, it is foul, and counts an ace against the offender.

6. When the player is about to strike the ball, and his opponent jostles him or gets in his way intentionally, it is an ace or a hand-out.

7. The contestants are allowed one minute at the expiration of each game before commencing another.

8. In a double match the striker's partner will stand with his back against either side wall, inside of the Ace Line, until the ball leaves the front wall.

9. If a ball served to the player goes over the Back-board or strikes the gallery before bounding on the floor, it is a foul.

10. The striker shall call time before serving the ball, and shall not

serve the ball before the player or players are outside of the line.

11. A foul must count as such whether the players play it or not.

12. In striking the ball the player shall not touch the ball with any part of his person other than the hand or foot, under a forfeit of an ace or hand-out.

13. If the striker in serving the ball strikes himself or his partner with the ball and it goes over the Ace Line, it is at the option of the player whether he plays to it or not.

14. In case there are only boundary lines drawn, and no side walls, if the ball after striking the front wall rebounds outside the side boundary line, such ball is foul, and is a hand-out.

15. All disputed balls may be decided by a referee chosen by the players, whose decision in all cases shall be final.

The early history of hand ball is probably the same as that of TENNIS, which was formerly played by striking the ball with the hand.

Temari, or Japanese Hand-ball. The ball used by the Japanese to play this game is about two inches in diameter, and generally of cotton, wound with thread. The players, usually girls, stand in a circle, and one, taking the ball throws it downward on the ground, striking it back as it rises. She continues thus till the ball bounds away from her, when the player toward whom it bounds, or who is nearest its direction, must strike it back. When any player misses a stroke, or fails to make the ball rebound, she is out of the game, which continues until only one player is left. That one is said by the Japanese to gain the honor of *kachi* (victory), and leads off in the next game.

HAND, Experiments with the. 1. Press the finger-tips of one hand forcibly against those of the other and open and shut the hands slightly. After a few seconds it is

easy, on shutting the eyes, to believe that there are coins between the finger-tips.

2. Hook the fingers of each hand, holding them as widely apart as possible, and then move the hands backward and forward through the air rapidly and forcibly for several seconds. The air currents between the fingers make them feel as if the hands were full of cotton or some other woolly substance.

3. Holding one hand horizontal, palm downward, and fingers closed, blow through the crevice between the first and middle fingers. If a piece of paper two or three inches square be placed just under this crevice, it will stick to the hand, though you are blowing directly against it. The reason is, that the current carries away some of the air between the paper and the hand, reducing the pressure, and the paper is thus held up against the hand by the greater pressure of the air below it.

4. Look closely at the inside of the fingers, particularly at the ends. It will be seen that they are covered with very small furrows, running in curved lines. By using a lens, these furrows can be seen more plainly. To make them plainer still, rub the finger lightly over a piece of chalk. The chalk will fill the furrows, which will thus be traced in white. A print of the furrows on paper can be obtained by spreading ink thinly on a piece of glass or a sheet of paper. When it is nearly dry, press the finger lightly on it and then on a sheet of white paper. After a few trials very good prints can be made. The arrangements of these furrows are said to be different in any two persons and to remain the same throughout one's life. An interesting experiment would be to verify this by taking a print of the same finger every year for a number of years.

HANGING GAME, THE, a game played by two persons, one of whom

puts on paper a row of dots, one for each letter of a familiar proverb, while the other tries to guess the proverb. The dots are separated into groups corresponding to the different words; for instance, for the proverb "Make hay while the sun shines" they would be placed thus:

.....
The guesser begins by saying "Write down an E" (or any other letter he chooses). If there is an E in the proverb, the other writes it down in place of the corresponding dot. If there are two or more, he writes which of them he chooses. The guesser then suggests another letter, and so on till enough are written down to enable him to guess the whole proverb.

In one corner of the paper is drawn rudely a picture of a gallows, with a rope dangling from it, as in Fig. 1.

When the guesser makes his first mistake, ordering the other player to write down a letter not contained in the proverb, a little circle, representing a man's head, is added to the rope on the gallows (Fig. 2). At his second mistake a neck is added, and, for the successive mistakes after that, a body, arms, legs, and feet, so that the gallows appears as in Fig. 3.

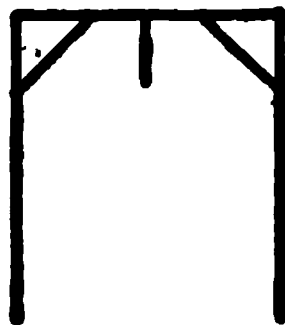


Fig. 1.

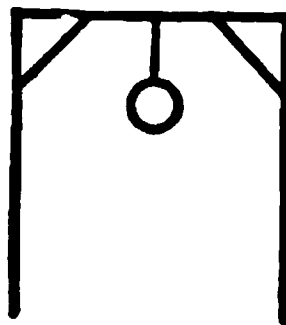


Fig. 2.

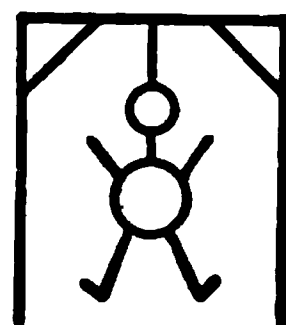


Fig. 3.

If the whole man is thus hanged before he can guess the proverb, he loses the game, otherwise he wins. When it is found that the guesser has become very expert, it may be

agreed that he shall not have so many chances, by "hanging" both legs or both arms for a single mistake. The guesser may show considerable skill in choosing his letters. At first it is best to suggest those that occur oftenest, such as the vowels, the letter S, etc. Afterward, the letters already written may suggest others; for instance, if a word stands "t. e.," it must be "the," "tie," or "toe," and its place in the sentence will often decide which is right. A dot standing by itself must be I, O, or A (see also SECRET WRITING). The only chance the other player has for skill, except in the selection of his proverb, is when the guesser suggests a letter of which there are more than one in the sentence, in which case he should of course write the one that he thinks will be of the least help in guessing. The guesser is usually allowed as many guesses as he chooses, which may be made at any time, but it is better to make a wrong guess count as a mistake. If the guesser is careful, he need not make a wrong guess, for probably no two proverbs have exactly the same number of letters in their words, taken in the same order. Instead of a proverb, it may be agreed that the dots are to represent any sentence which makes guessing more difficult. The game can be made harder also by not separating the dots into groups. The name, "The Hanging Game," is from the way in which the mistakes are scored.

HARDNESS, Experiments on. When one substance will scratch another, the first is said to be harder than the second. It is an interesting experiment to make a list of all the substances one can obtain, in the order of their hardness. Sometimes one substance will be the hardest in the list for a long time, till finally another is found which will scratch it. To try the experiment fairly, a sharp point or

edge must be found to scratch with. It will be seen that hardness has nothing to do with brittleness; glass, for instance, being much harder than soapstone, for it will scratch it easily. Yet it is not difficult to break a pane of glass with a lump of soapstone.

HARE AND HOUNDS, or PAPER CHASE, a running game played by any number of persons. One or two of the players are chosen as hares, and each is provided with a bag filled with small clippings of paper, called the "scent." The hares start off together, the rest of the players, called hounds, not being allowed to see the direction they take. After from five to fifteen minutes, according to agreement, the hounds set off in pursuit. The hares, as they run, throw out, now and then, handfuls of the scent, by which means the hounds are enabled to follow them. They may try to puzzle their pursuers by turning back, or taking a new direction suddenly, or in other ways. The run may be for a certain number of miles, or for a certain length of time, agreed on at the start. If a hound catches one of the hares in the specified distance or time, he wins, otherwise the hares win. If a hound catches sight of the hares, he and his companions may not run toward them directly, but must follow the scent, though it is sometimes allowed if previously agreed upon. Where boys play the game, instead of using paper "scent," the hare sometimes carries a piece of chalk, with which he makes a cross, or other mark on a fence, a stone, or the pavement, and the hounds follow by these marks. When the hares are strong and skilful, they can often elude the hounds with very little start. Sometimes there are formed regular Hare and Hound clubs, which hold "meets" or runs at stated times, and have rules by which these runs are regulated. In summer the "scent" should be of white paper;

in winter of black, so as to be seen easily on the snow.

Sometimes the hares can deceive the hounds by laying a false scent faintly, while the real one is strong. The hounds will generally conclude that the hares are trying to make them take the strong scent, and will therefore follow the faint one. If one hare is a better runner than his companion, he is given the task of laying all the false scents, otherwise the two do so by turns. In case the hares are allowed to lay the handfuls of scent so far apart that there is delay in finding it, it is very seldom that they are caught by the hounds. The sport then consists in a contest between the latter to see who shall reach the end of the run soonest. Sometimes two rival clubs form the pack of hounds, and the victory is decided by adding together the numbers representing the order in which each member of the club reaches the finish. Thus, suppose that two clubs of five men each, distinguished by the colors red and blue, come in in the following order: Red, blue, red, red, blue, blue, blue, red, blue, red. The score would be as follows:

Red.	Blue.
1	2
3	5
4	6
8	7
10	9
—	—
26	29

Red is therefore the winner, the smaller numbers representing those who come in first.

The Germans call this game *Schnitzeljagd* (Scrap-hunt).

RULES OF THE GAME.

The National Cross Country Association, to which most of the Hare and Hound clubs in the United States belong, has adopted the following rules for the sport.

1. *Slow Chases*.—There shall be two Hares, one Master of the Pack, and two Whips, to be appointed by the Club Captain or other recognized authority.

2. The Hares shall be allowed a start of from five to ten minutes, at the discretion of the Captain.

3. The Master, who shall act also as Pacemaker, shall have sole control of the Pack, and until the break is ordered, he shall, at his pleasure, appoint temporary Pacemakers at any period of the chase.

4. The members of the Pack must keep within hailing distance of the Master, and under ordinary circumstances must always keep behind the Master until the break for home is ordered.

5. Only one break shall be ordered by the Master, and then only for home; such break shall never be more than a mile.

6. It shall be the duty of the Whips to keep the Pack together, and to collect and assist all stragglers.

7. *Fast Chases*.—In fast chases there shall be two Hares, who shall be allowed a start of from five to fifteen minutes, to be fixed by the Captain after considering the relative ability of both Pack and Hares.

8. The scent shall be laid from the start, and each hound may run at his own pace.

9. It shall be in the discretion of the Captain or other officer acting in his stead, to order a break for home or to allow the Pack to race from start to finish.

10. *General*.—Club runs shall be runs for which no scent is laid, but in all other conditions must conform to those of a slow chase.

11. In all chases the Hares shall lay a fair and continuous trail throughout, and shall not be allowed to double on their trail; they shall be allowed to cross fordable streams only, and must sur-

mount all obstacles over which they lay the trail.

12. In all chases the Hares must keep within hailing distance of each other.

13. Under no circumstances must the Pack follow the line of sight when the Hares are seen, but must always follow the trail.

14. In all chases the break for home shall be indicated by a scattered bunch of paper, different in color from that used on the trail.

15. Touching one of the Hares by any member of the Pack shall constitute a catch.

16. If the Hares do not finish together, the time of the last Hare in shall be considered the time of their arrival.

17. A Slow Pack may be started at the discretion of the Captain in all runs and chases (except for prizes), under the control of a Master and two Whips. A start of one minute for each mile estimated to be covered shall be allowed by the Fast Pack.

Hare and Hounds is a very old sport in England. In an old comedy of the 16th century a schoolboy is represented as saying ;

"And also when I play and hunt the fox,
I outrun all the boys in the school."

This refers to the modern Hare and Hounds, which as late as the last century was called Hunt the Fox, or Hunt the Hare. In 1868 it was adopted as a sport by older persons, and it has ever since held a place among athletic sports.

HEARTS, a game of cards, played by two to twelve persons, with a full pack, and any desired number of COUNTERS. The counters are divided equally among the players, and the cards are then dealt, one by one, as in whist. For instance, if six are playing, each will have eight cards, and four cards will be left. Those that are left are laid aside for a time. As soon as the cards are dealt, the one at the

left of the dealer puts one or more counters in the middle of the table, a large number if he has a good hand, but otherwise a few. This is called the "ante," and the antes of all the players together form the "pool." Each of the others must place in the pool, for his ante, as many counters as the first player put in. Some players put in three counters each to form the pool before the cards are dealt. Beginning at the dealer's left, each then plays one card, following suit if possible, he who plays the highest taking the trick, and then leading. The taker of the first trick takes also the cards, if any, that were left over in dealing. The rank of the cards is the same as in WHIST, but there are no trumps. The object of the game is to take no Hearts, and so long as none are played it makes no difference who takes the tricks except to decide who shall lead. The players usually try to get rid of their high cards at the beginning of the game, and Hearts should never be led unless by watching the cards played, the leader is sure that the trick must be taken by some one else. Large Hearts should be thrown away in preference to all other cards. When all the cards have been played, each player must place in the pool a counter for every card of the Heart suit that he has taken. The pool is then divided among those who have no hearts; but if every one has some, the counters remain to form part of the next pool. Sometimes this is varied by giving the pool to him who has least Hearts. The game can be played for any length of time agreed on, and at the end of that time the one who has most counters is the winner. If any one has given out all his counters, he may be allowed to borrow from some one; but his debt, if unpaid, must be remembered in counting up to see who has won.

In Hearts, a low hand is generally a good hand. High Hearts are

very bad to have, and so are high cards of any suit that has been played once or twice. It is therefore best to lead a high card of

Helioetat. (See page 408.)

some suit that has not been played, or a low card of some other suit. It is of course always safe to lead the lowest Heart, and generally safe

to lead one of the lowest three. When a player is obliged to take a trick he should do so with the highest card possible and, in general, he should always try to get rid of high cards in any way except by taking a trick on which a Heart has been played or is likely to be played. The player must watch how the cards fall as carefully as in WHIST, and special account must be kept of the Hearts.

The Double or Eagle Game. Each player, instead of paying the pool one chip for each Heart he takes, gives for an Ace, 14; a King, 13; a Queen, 12; a Knave, 11; and for each of the other cards as many as the spots it bears. Sometimes an Ace counts, 5; a King, 4; a Queen, 3; a Knave 2; and each of the other cards, 1.

HELIOSTAT, an arrangement for throwing sunlight into a room, much used in experiments with light. The light is reflected in by means of a mirror, but, as the sun is continually moving, the mirror also must move, or else the direction of the sunbeam would change. In very fine heliostats this is done by clock-work, but in the one about to be described, which can be made by any one, it is done by hand. The illustration shows the different parts of the instrument. AB is a board which fits in a window, CC two ordinary iron brackets, and D a shelf. The size of all these parts is given by the scale at the bottom of the cut. H is a round wooden rod turning freely in a hole in the board AB and in the block K. It is kept from slipping by the wooden washer M fitting tightly over it. The other end has a slot in it in which turns a wooden semicircle G, screwed to the back of a board N, to which is fastened a piece of silvered glass (not ordinary looking-glass) by means of elastic bands. The sunlight is reflected from this to another mirror, O, on the shelf D, and thence through the hole B into

the room. The rod with its slot is shown separately at JI, and the semicircle at G.

The proper working of the whole arrangement depends on getting the rod H at the correct angle. The angle made by this rod with a horizontal line must equal the latitude of the place where it is used, for instance $40^{\circ} 45'$ at New York or $42^{\circ} 22'$ at Boston. If this is done, when the heliostat is put in a window facing directly south the rod H will point to the pole-star. Since the sky appears to turn around the pole-star, the daily motion of the sun can be followed by simply turning the rod H from time to time, thus keeping the reflected sunbeam in the same direction. But since the sun changes place a little every day the mirror N will have to be tilted at a slightly different angle every day by turning it around the middle point of G.

In case the room has no window which faces the south exactly, the one which does so most nearly must be selected and the board twisted a little in the sash so that it will look directly southward. The upper part of the window, and all other windows in the room, must be covered with shawls or blankets so that no light can enter except the beam sent from the heliostat. It is a good plan to have a plain wooden table just under the opening through which the beam comes, for making experiments.

HEN, THE. A game played by any number of persons who sit in a row. The leader, who is at the end, says to his neighbor, "I have a hen," and each in turn must repeat the words to his nearest neighbor. When they have reached the farther end of the line the player at that end asks of the one next him, "Has she feathers?" And when this question has travelled back to the leader he returns the answer "She has feathers." Then follow in like manner the questions and

answers, "Can she walk?" "She can walk." "How does she walk?" "Wiggledy-woggledy, wiggledy-woggledy." (As each player says this he imitates the walk of a chicken with his hands). "Can she crow?" "She can crow." "How does she crow?" (each then imitates the crowing of a rooster).

The object of the game is to keep from laughing, which is usually difficult. Any one who laughs or makes a mistake in repeating the questions and answers must pay a forfeit.

This game is played by German children, who call it "Entchen Verkaufen" (Duckling Buying).

HERBARIUM, a collection of dried plants. The collector should be provided with a tin botanical case, or with two or three dozen sheets of thick soft unglazed wrapping paper between two boards. The sheets of paper and boards should be a little larger than the sheets, or scrap-book, in which it is intended to preserve the plants. Each specimen, as it is gathered, is placed in the case, or between two of the sheets of paper. On reaching home, the collector must transfer his plants to fresh sheets of paper of the same kind, placing three or four sheets between each pair of specimens, and must place on the board at the top any convenient weights, such as books, or bricks. After letting them remain thus twenty-four to forty-eight hours, they must be removed to fresh paper and pressed again for an equal length of time. The damp paper from which they are taken should be dried before the fire, or in the sun, before using again. The specimens must now be mounted, or fastened to separate sheets of paper. This may be done either by gumming down the whole plant, or by pasting little paper bands across parts of it. The latter method admits of removing the specimen if

desired, or changing it to a fresh sheet. The plants may be mounted in a scrap-book, but the better way is to put each on a separate sheet. The sheets may be kept in a box, under a light weight. A bit of camphor in the box will preserve the dried plants, but the best plan is to look them over thoroughly every six months, thus airing them well. Care should be taken not to put them away in the box unless they are quite dry, otherwise they will mould.

The name of the plant should be marked on each sheet, with the date and place of its collection. If the collector is a student of botany, he will of course add the botanical name, and will arrange his leaves by genera and species. The botanical collector will have to be careful about some things which need not trouble one who collects merely for amusement. He must take care to have his specimens show well all the characteristic points of the plant, and each should bear fruit or seed-vessel, if possible, as well as flower.

Sea-weed. To prepare sea-weed for mounting, the specimen must be floated on the surface of water in a bowl or soup-plate, and then the card or paper to which it is to be fastened is slipped under it. If the paper is not stiff, it should be supported on a slip of glass or of tin perforated with holes to allow the water to drain off. The sea-weed should now be arranged on the card, under water, with a camel's hair brush, and any unnecessary parts removed with scissors. The paper and sea-weed together are now removed, laid on blotting-paper, and covered first with a piece of linen, and then with another piece of blotting-paper. After this it is pressed like any other specimen. Most sea-weed will adhere to paper of itself, but some specimens require a little mucilage.

HEXMEX, a game played by two persons, with slate and pencil, or

paper and pencil. Each makes on the slate marks like the following.

8 † † † † † † † † † †.

the first sign representing a king and the others common soldiers. Each can have only one king, but as many soldiers as he pleases. One of the players now takes his pencil and repeats a nonsense rhyme, keeping time to it by pointing at the signs, in regular order, first to one of his own and then to one of the other player's. The soldier or king on whom the last word falls is dead, and is crossed or rubbed out. The other player repeats the operation, and so on alternately till one of the kings is dead. The owner of the living king is then the victor. Any ordinary COUNTING-OUT rhyme may be repeated. In Germany, where it is much played, the following is one of the common rhymes used, and gives the game its name:

Hex mex Mere mex,
Peter Paul Pom-pex,
Schlägt alle bösen Buben mit der Kugel
auf den Kopf Mause todt.

Which is in English:

Hex mex, Mary mex,
Peter Paul Pom-pex,
Knocks all bad boys with a stick on the
head dead as mice.

HIDE AND SEEK, or HIDE AND WHOOP. See I SPY.

HIDE THE HANDKERCHIEF, a game played by any number of persons, one or more of whom look for a hidden object, generally a handkerchief. The game is played in various ways. Sometimes one player hides the object and all the rest look for it; and sometimes only one or two look, while the others tell them whether they are near or far from the object, generally by saying "cold" when they are far away, "cool" when not quite so far, "warm" when near, and "hot" or "burning" when very near. He who finds the object first hides it again. The game is often called "Hide the Thimble," or by other names, according to the object used.

Magical Music, a kind of Hide the Handkerchief, in which the

seeker is told by music, generally that of a piano-forte, whether he is near or far from the object. The music may be softer as he approaches the object, ceasing altogether when he has found it, or it may be louder as he comes nearer the object. The "music" is often made by striking a poker against a pair of tongs.

Hide in Sight, a kind of Hide the Handkerchief, in which the object, usually something unnoticeable, like a small coin, is placed where it may be seen without removing anything, for instance, on the floor, or on a table or chair. One of the players thus places it while the others are out of the room. The latter enter at a signal and begin to look for the object. As soon as any one sees it he sits down quietly, while the others go on looking. He who is last to sit down places the object for the next search.

HIGH-LOW-JACK. See ALL FOURS.

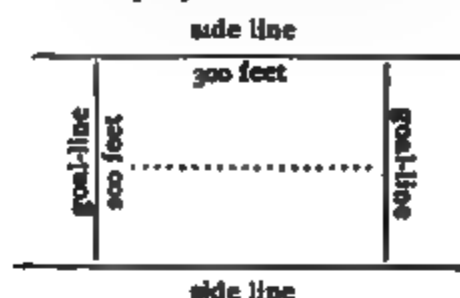
HITCHINSON FAMILY, THE. Four or more grotesque life-size

FIG. 1.

figures are painted on a canvas curtain, through which holes are cut

where the faces of the figures should be. (See Fig. 1). Into these holes the performers put their faces, from the rear of the curtain, making a comical effect from the front (Fig. 2). They may thus give any kind of concert or minstrel performance. Some of the figures may be made tall and others short, the persons behind the curtain standing on chairs, or kneeling on the floor, as

about 200 feet apart, as shown below. An umpire having been selected, the players choose sides, and



each side elects a captain. The captains decide in any way they please, usually by lot, which shall have the knock-off, and which the choice of goals, the winner taking whichever of these privileges he likes. The players then stand each with his back to his own goal, and at a distance from it not greater than one third the length of the field. The captain of the side which has the knock-off, or some one chosen by him, then places the ball on the ground as far forward as he chooses, within the above-stated limits, but equally distant from both side lines, and strikes it with his hockey. As soon as it moves, any player is free to go to what part of the field he chooses, his object being to prevent the ball's passing over his own goal-line, and to drive it across the enemy's line. The side which does this first wins the game.

FIG. 2.

the case may require. A showman may introduce the "family" to the audience, giving a comical history and description of each member.

The name "Hitchinson Family" is in imitation of the "Hutchinson Family," a popular band of singers who went around giving concerts from about 1840 to 1860.

HOCKEY, or SHINNEY, a game played by any number of persons, each of whom has a stick with a curved end, called a hockey, or shinney, with which he tries to drive a small ball past a line called the goal-line. The field has two goal-lines about 300 or 400 feet apart, and is bounded on the sides by lines

The sticks used in playing hockey may be of different sizes at the pleasure of the player, but the curved end is generally not more than four inches long. They are sometimes bent from straight sticks, but oftener cut from saplings, part of the root forming the curve. When the game is played on the ice, as it often is, a lighter stick should be used, as less force is required to drive the ball. The ball is commonly of rubber, about two inches in diameter, but a small block of wood called a nun, of about the same size, is often used instead. The ball is better, for it is not so dangerous. Hockey is not played by regular clubs, like foot-

ball or base-ball, and the rules differ somewhat in different places. Those usually followed are given below.

RULES OF THE GAME.

1. Each captain shall place his players as he pleases, sending some forward to try to drive the ball across the enemy's goal-line (called "running in"), and some backward to defend his own line (called "lying back").

2. Each player must strike the ball from right to left. If he do so in any other way, he may be told by his opponent to "shinney on his own side," and at the third offence he shall be disqualified by the umpire and must leave the field. (In many places, when no umpire is chosen, custom allows a player to strike an offender against this rule on his shins, but this should not be permitted.)

3. No player shall strike another's hockey except in so far as he must do so in trying to drive the ball. (In many places, when two players meet, each tries to knock the other's stick from his hands before touching the ball, but this should not be permitted, as it places skill below mere strength.)

4. With the exception of the cases stated in the two following rules, no one shall touch the ball with his hand.

5. When the ball is driven over one of the side lines, the player who reaches it first shall take it in his hand, and going to the point where it crossed the line, throw it on the ground near any player he pleases, either back toward his own goal, or directly across the field, but not toward the enemy's goal.

6. When the ball falls into a hole, or is in any place out of which it cannot be driven with hockeys it shall be withdrawn with the hand, by order of the umpire, and thrown by him between any players of opposite sides, chosen by the captains.

7. Questions not touched by these

rules shall be decided by the umpire.

History. Some authorities think that POLO, or hockey on horseback, was the original form of the game. The modern form of hockey was played long ago in England, where it was also called Hookey and Hawkey. Some say that the name is from Hock-day, a holiday that celebrated the expulsion of the Danes from England, and others that it is from the hooked sticks with which the game is played. Games similar to Hockey are LACROSSE and GOLF.

HONEY-POTS, a game for very small children, any number of whom may represent honey-pots, while older persons take the part of honey merchant and customers. The honey pots sit on the floor or grass

Weighing a Honey-pot.

in a row with hands clasped under their bent knees. After a dialogue between the merchant and a customer, in any words they please, the latter selects a honey pot, and they proceed to weigh it. This is done by taking the child by the arms and swinging him backward and forward till he is compelled to unclasp his hands and allow his feet to touch the ground or floor. The pot is supposed to weigh as many pounds as it has had swings. Another cus-

tomers may now appear, or the same one may make some objection and desire to try another pot.

In another similar game played in England, the child who lets go is called "Rotten Egg," which is regarded as a disgrace. The game in Italy is called "Weighing." The child, after being lifted, is made to jump over one of the arms of his bearers. If he escapes, he is supposed to be going to Paradise, otherwise to the infernal regions. There are similar French and German games.

HONORS, a SOLITAIRE game of CARDS, played with two packs. The Two of Spades, King of Hearts, Ace of Diamonds, and Queen of Clubs are placed in a row, and below them the King of Spades, Queen of Hearts, Knave of Diamonds, and Ten of Clubs. On these cards the others are to be built in families, following suit; building upward on the upper row and downward on the lower, ending in each case with the card next in rank to the one at the bottom. In playing, the cards are laid off from the pack in two rows of ten each, except those that are available for building, which are laid at once in their proper places.

A card may now be placed on each of these twenty in any order the player wishes, and when this has been done three more cards may be laid off from the pack. An empty space in the rows may be filled with the top card of any pile, and any top card that becomes available is used at once in building. If the families can be completed thus, the player wins.

HOODMAN BLIND. See BLIND MAN'S BUFF.

HOOK 'EM SNIFFEY, a game played by any number of persons with a ring at the end of a long cord tied to the limb of a tree. A hook is driven into the tree, and the players in order try to swing the ring so that it will catch on the hook. He who succeeds scores a

point. Instead of a tree an upright post with a crossbar is often used. Sometimes, instead of one hook, a board is arranged with several hooks, each of which has a number under it. In this case the successful player scores the number of the hook on which he hangs the ring. After any number of turns agreed on, he who has scored the highest number of points wins.

HOOPS. To trundle a hoop well requires considerable skill. It is more difficult to do it slowly than swiftly, but those skilled in the art can keep one in motion even while walking. The strike should be made directly forward, and not at all on the side of the hoop, otherwise the motion will be unsteady. It may be steadied by holding the stick flatly against the sides alternately, and it is steered in the same way. The best part of the stick to strike with is a point distant from the hand by two thirds of its length. This is what is called the centre of percussion. In any other place the full force of the blow is not utilized. The hoop can also be trundled by holding the stick firmly against the middle, and pushing, not striking. Some sticks, especially iron ones for driving iron hoops, are made with a hook at the end for holding the hoop when trundled in this way.

The fact that a hoop is easier to keep up when rolling swiftly depends on the principle that a rapidly revolving body requires more force to move it out of its plane than one which is not revolving at all, or but slowly. The same principle is shown in the TOP, or the BICYCLE.

Hoop Games. Several games can be played with hoops. In one, the players form in two lines, facing each other, each with his hoop in hand. At a signal, the lines advance, and each must guide his hoop between two of the opposite line. The game can be varied by agreeing that if any one let his hoop

fall, or do not guide it properly through the opposite line, he shall be out of the game. Then, after the players have passed forward and backward a number of times agreed on beforehand, the side on which the greatest number of players remains is declared the winner. In another game the players try to run through their hoops both ways, keeping them rolling at the same time. He who can thus go through his hoop most times, while the hoop is rolling any distance agreed upon, is the winner. This game requires large hoops. A difficult feat is to keep more than one hoop rolling at once, or to trundle a large and a small hoop, making the small one pass through the large one at intervals.

Hoop Races, races in which each contestant trundles a hoop. He wins who first crosses the finish line, or who first drives his hoop across it, as may be agreed beforehand. In another kind of race, he wins who crosses the finish line last, without letting his hoop fall, the object of the contestants being to trundle their hoops as slowly as possible.

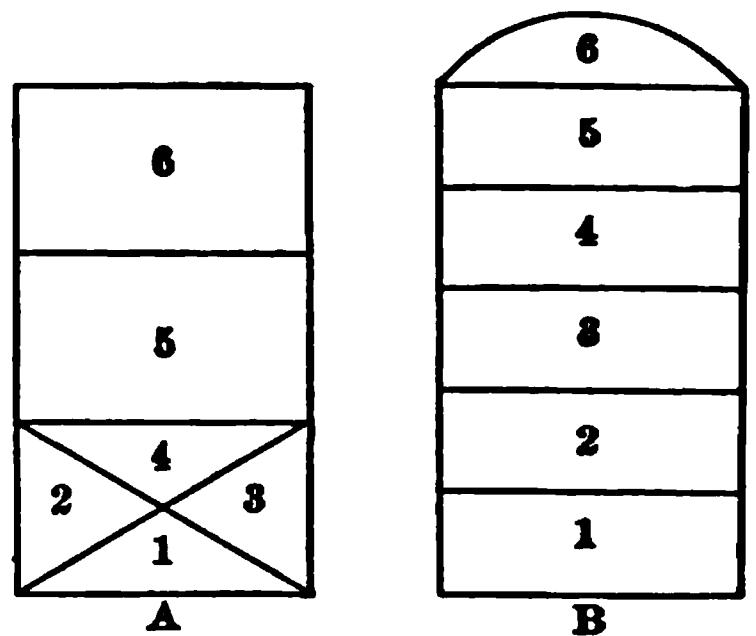
Turn-pike, a game played by any number of players, about half of whom have hoops. Lots are drawn for the hoops, and those who fail to draw them are called toll-keepers. A large circle, from 100 to 150 feet in diameter, is marked out, and at equal distances on this each toll-keeper puts up his toll-gate, consisting of two stones three or four inches apart. The other players drive their hoops around the circle, and if any fail to send his hoop through one of the toll-gates, or strike the stone on either side, he becomes toll-keeper, and the toll-keeper at that gate takes his hoop.

Posting, a modification of the game of Turn-pike. Each one of the toll-keepers has a stick suitable for driving a hoop. Whenever a hoop reaches a gate, the driver

changes places with the toll-keeper, who drives it as far as the next gate, changing in turn with the toll-keeper there. Whoever allows a hoop to fall, is compelled to leave the game for one round, or to pay a forfeit, or is punished in whatever other way may be agreed upon beforehand.

HOPPITY. See CHECKERS.

HOP SCOTCH, or **POTS**, a game played by any number of persons, each of whom drives a pebble from one part to another of a figure on the ground by hopping or stepping in various ways. The figures may be drawn on the ground with a pointed stick, or marked with chalk on a pavement or floor. Several forms of the figure are given below, B being the one commonly in use in New York, where the game is usually called Pots. The numbers are not put down when the game is played, but are given here for convenience. The player be-

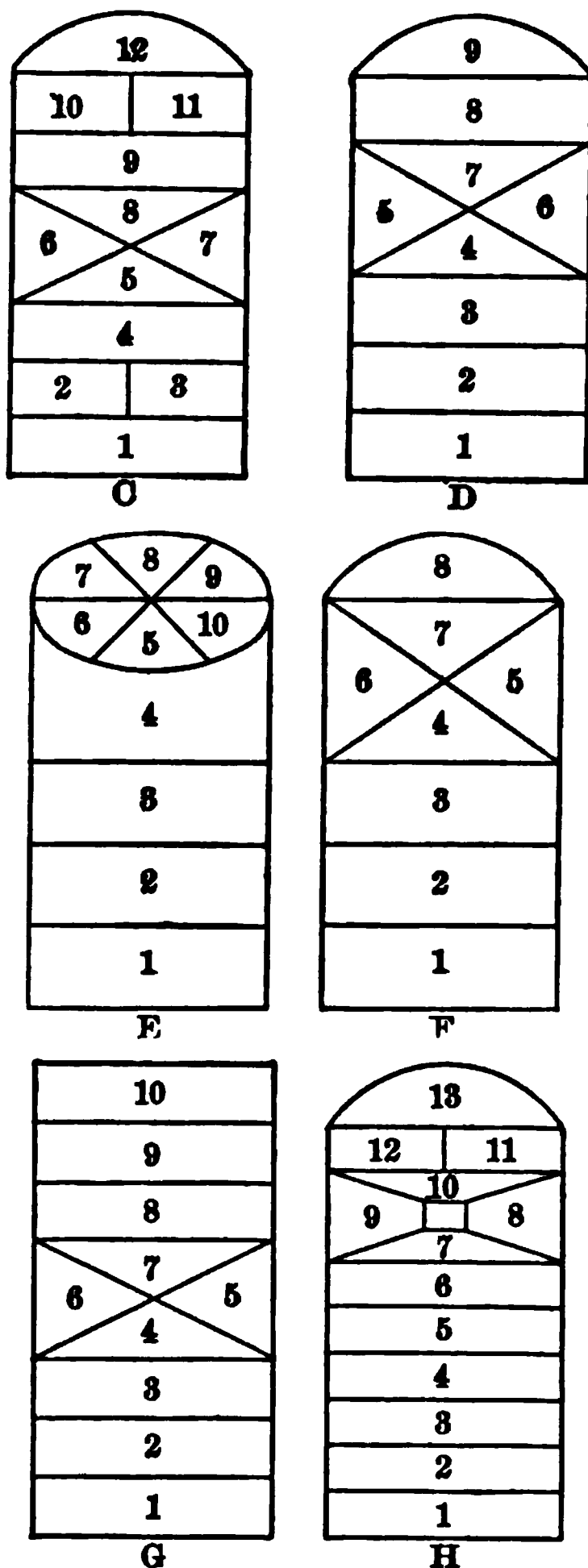


gins by standing outside the figure at the lower end, and throwing a pebble, shell, or bit of wood into the place marked 1, and then, stepping into it with his right foot, jerks or kicks the pebble out toward the place where he began, with that foot. He then steps back to the starting-place, throws the pebble into No. 2, steps with his left foot into No. 1 and with his left into No. 2, and jerks the pebble out as before. He thus goes on, throw-

ing the pebble into each place in the order of the numbers, stepping up to it through the spaces, putting only one foot in each, and after kicking the pebble back to the starting-place, stepping out in reverse order. This is then repeated, except that the player hops into each space instead of stepping. Or hopping on one foot, he kicks the pebble with that foot successively into each space, and then back again in like manner. If he throw the pebble wrongly, or upon a line, or put two feet into any space, or step on a line, or do not jerk the pebble back as far as the starting-place, or if he put both feet on the ground while hopping, his turn ends and the next player begins. When a player's turn comes again, he goes on with the game where he left it, and he is the winner who first goes through the required tasks. The game may be varied at pleasure. It is played differently in different countries, and even in different towns. Sometimes the player, when he reaches the pebble, is required to place it on his toe, and then, kicking it into the air, to catch it in his hand.

The figure marked D is used in Scotland, E in Germany, and F and G in France. The spaces are often given different names. Sometimes they are all called "beds;" and the last bed is called in England the "plum pudding" or "cat's head." The game is called "Pottle" in some parts of England, and "Peever," "Peeverals," or "Pabals" in Scotland. The German name is "*Paradies hüpfen*" (Paradise-Hopping), the end space being named "Paradise," and in Austria it is called "*Tempel-hüpfen*" (Temple-Hopping), one of the spaces being called *Tempel* (the Temple). In France, where it is called *Marelles*, the end space is "Paradise," as in Germany, and the 5th in the one marked G is "*Enfer*" (Hell) over which the player must leap. The

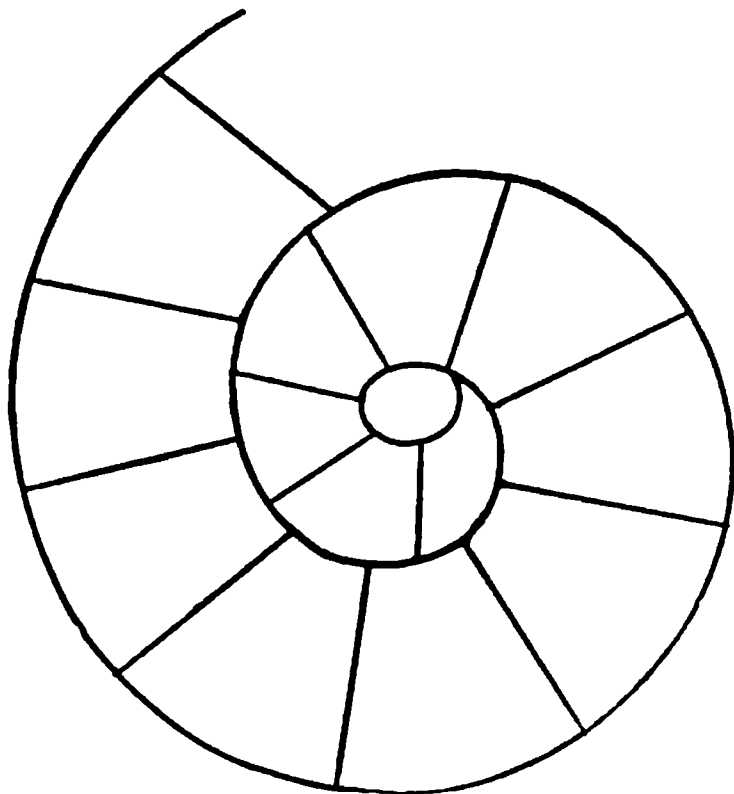
6th is called "*Reposoir*" (the Resting Place), and there the player can stand on both feet. The French also have *La Marelle Ronde* (Round



Hop-Scotch Figures.

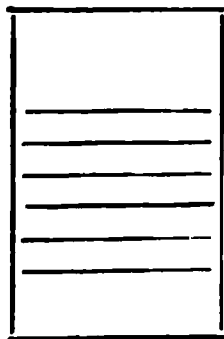
Hop Scotch), where the figure is spiral as shown in the diagram, and *La Marelle des Jours* (Hop Scotch of the Days) where the spaces are named for the days of the week.

History. Hop Scotch is probably a very old game. The earliest mention of it in England is in Poor Robin's Almanac for 1667, where it is called Scotch Hoppers. A French authority speaks of it as having been



La Marelle Ronde.

"much in vogue before the introduction of cards in his country." The name *Marelles*, by which it is called there, is also that for what we call NINE MEN'S MORRIS. It is a common boys' game even in India, where it is called *Ekaria Dukaria*, and where the figure is shaped thus:



It has been suggested that it was carried to India in the sixteenth century. The word "scotch" in the common name of the game means to strike, and is probably from the strike given to the pebble by

the foot.

HOT COCKLES, a game played by any number of persons, one of whom kneels with his head in another's lap, while the rest of the players strike him in turn. As each one does so, the kneeling player guesses who struck him, and when he is successful, the striker must take his place.

History. Hot Cockles is a very

old game, having been played at least five hundred years ago. The poet Gay refers to it in the lines:

"As at Hot Cockles once I laid me down
And felt the weighty hand of many a clown,
Buxoma gave a gentle tap, and I
Quick rose and read soft mischief in her eye."

A variation of this game, called Frog in the Middle, was once popular in England. One player, called the Frog, sat on the ground and was buffeted by the others, standing around, till he could catch one of them, who then took his place. The Greeks had a game similar to Frog in the Middle, which they called Chutrinda (the Pot Game), the Frog being named Chutra (Pot). The name Hot Cockles is said to be a corruption of the French *Hautes Coquilles* (warm hand). The French call it *Main-chaude*, and in the middle ages its name was *Qui fery* (who struck)? A picture on an ancient tomb in Egypt shows that a similar game was played in that country.

HOW DO YOU LIKE IT? A game in which one of the players guesses a noun, agreed upon by the others, by their answers to three questions. The questions are usually "How do you like it?" "When do you like it?" and "Where do you like it?" The guesser, who goes out of the room while the company chooses a noun, comes in and asks each in turn the first of these questions. If he cannot guess, he asks the second, and then the third, and if he is still unable to tell what the word is, he must pay a forfeit, or he may be sent out again while another word is chosen. The game is usually made more puzzling by selecting a word with two different meanings, like pen (an enclosure) and pen (a writing implement), or two words of similar sound, such as bell and belle, rain and reign, or quay and key. For instance, with the words hair (of the head) and hare (an animal) different answers to the question where do you like it might

be "on my head," "in a stew," "in a pillow," or "running about in the woods." Instead of the last question given above, "Where will you put it?" is sometimes used.

HOW MANY MILES TO BABYLON? See **THREAD THE NEEDLE.**

HUNTING. In this article, hunting will be treated as a sport, though even sportsmen generally consider that it is not right to kill an animal for pleasure alone. Game must be killed for eating, unless it is a dangerous creature or a nuisance. Thus, it is not considered sportsmanlike to shoot song-birds not good for food, but it is thought proper to hunt an animal like the fox, though his flesh cannot be eaten, because he is destructive. There are many different methods of hunting, and some animals have to be pursued in special ways, but the most common method of killing game in this country is by shooting, to which this article will chiefly be devoted. The use and care of guns is described in the article on **SHOOTING.** Shooting may be enjoyed in the open field, in the woods, called "cover," or "covert" by sportsmen, from the French *covert* (covered), or on the water. The sportsman often has the assistance of dogs, which are trained to point out the game when they scent it, and to "retrieve" it, or bring it to their master when it is killed.

When boys begin to hunt, they generally shoot at a bird on the ground or in a tree, or wherever they see one; but older sportsmen think the true way is always to "flush" the bird first and shoot it "on the wing," that is, while flying. Of course this requires more skill, but a successful shot made in this way gives the sportsman more pleasure. It is estimated that not more than two or three birds are killed out of every five fired at, so that a young sportsman need not be discouraged because he does not hit every bird.

Two persons often go on a shooting expedition together, in which case the rule must be observed that one sportsman must never shoot at a bird which is flying toward his companion. More than two persons cannot usually shoot together with advantage, except on opposite sides of a river or in some similar position, where the parties drive the game backward and forward from one to the other. A sportsman should never fire across his companion's face, or at any bird which flies so that it must cross him, until he to whom the bird belongs has missed it with both barrels of his gun. Birds flying directly away from both sportsmen are taken alternately, unless several rise at once, when each man should fire at those on his own side. When a bird is shot the shooter should observe carefully where it falls, noting some object near by. Birds which alight should also be carefully observed, which is called "marking," and is often difficult for any but practised sportsmen. One should be certain, in doing this, that the bird has actually alighted, and has not merely flown behind some object which hides it from sight.

Dogs. The different kinds of dogs are described in the article **DOG**, in C. C. T. The following rules for their management in shooting birds are substantially those given by "Frank Forrester" (W. H. Herbert) in his "Manual for Young Sportsmen."

1. Never do that for which you would punish a dog, as running after a "winged" bird (one shot in the wing so that it cannot fly).

2. Never hunt your dogs with other dogs not well trained, as their example will do them harm.

3. Never hurry them when they are pointing.

4. When the birds rise, make the dogs "down" for one or two seconds. This tends to make them steady, and even if the sportsman

does not fire, it gives him time to "mark."

5. If a dog devour a fallen bird, do not chase him, as that will only excite him, but call to him till he returns, and then, making him drop, put the check cord on his collar, drag him back to the place where he started, whipping him and rebuking him, and make him lie there several minutes.

6. In buying a dog, try to learn the exact mode of hunting and words of command used by his former owner, and, if possible, conform to them.

7. Never punish a dog unless you are certain that he cannot fail to understand the reason.

8. Never allow a dog to commit a fault because you are afraid of losing time or losing birds by correcting him. Correction should be by the voice, the whip, and by making the dog pause and recognize his fault. Never kick a dog, and use the whip as little as possible; but when it is used, use it so that it will be remembered.

9. Make as little noise as possible in calling a dog. Dogs which are always shouted at get so that nothing but a shout will turn them. If possible, they should be trained to follow the motion of the hand.

10. Make friends with your dog, without absolutely caressing him, as soon as you have done punishing him, and before allowing him to rise.

11. When he is at point, never allow him to flush his game without giving the order "on," and then instantly saying "Drop."

12. When he is down, never allow him to rise until you have ordered him "up."

13. When a bird is killed, whistle and say "Dead," at which he should come to you. Then say "Seek" or "Find," when he must draw up and point the dead bird.

14. When he is pointing thus, never allow him to recover the bird till you order him to "fetch."

15. When he has retrieved, he should deliver the bird into his master's hand; otherwise he may at some time lay one down where it cannot be easily reached.

16. Never break a sporting rule in order to recover a wounded bird or get a shot at a live one.

17. Never lose your temper.

The behavior of dogs in the hunting-field depends much on their treatment at home.

Every dog should have a separate kennel, which should be movable, and without a bottom. It should stand on a board floor or platform, and inside should be placed plenty of fine pine shavings for the dog to lie on. Straw and other similar substances are apt to cause vermin.

Dogs may be fed on table scraps and given meat sparingly. They should be supplied with plenty of pure water, care being taken to change it frequently. Exercise every day and frequent bathing in hot weather is necessary. In the country they should be taken out for a run of an hour or so every day. Before the shooting season they are improved by a fast run under a wagon, which hardens their feet and makes them capable of greater endurance. Where space can be had, the dogs should be allowed to run about in a yard, instead of chaining them to the kennels. Dogs thus treated will need less outside exercise. Where there is not much room for dogs to run about, a good plan is to fasten the chain to a ring which is free to run backward and forward on a strong wire stretched between two posts, or along the side of the house or barn.

The following table shows the charges suitable for small game. Different sportsmen vary them considerably. The larger wild animals are generally shot with a rifle. Special hunting methods are described below under the name of each kind of game.

GAME.	Gauge	Pow- der. Drums	Shot Oz.	Size and Kind of Shot.
Sora, Rail, etc..	12 16 20	24	1	10 Trap
Woodcock	10	4	14	10 Shot
Snipe	12	34	1	10 Shot
.....	10	4	14	9 Shot
Quail	12	34	14	9 Shot
.....	10	4	14	8 Trap
Prairie Chicken..	12	34	1	8 Trap
.....	10	44	14	8 Shot
Ruffed Grouse...	12	34	14	8 Shot
.....	10	44	14	7 p
Squirrel	12	34	14	7 t
.....	10	44	14	6 t
Teal	12	34	14	6 t
.....	10	44	14	7 t
Pintail	12	34	14	6 t
.....	10	44	14	5 t
Mallard	12	34	14	5 t
.....	10	44	14	4 t
Redhead	12	34	14	4 t
.....	10	44	14	3 t
Canvasback	12	34	14	3 t
Turkey	10	5	14	3 t
.....	12	34	14	2 t
Goose	10	5	14	B
.....	12	34	14	B

Snipe, wading birds which frequent marshes and flat lands (C. C. T.). They appear in meadows and salt marshes in the spring about the same time with bluebirds. In windy weather they often rise high in the air in "whisps" or knots of 10 or 20, and it is then hard to shoot them. Good snipe-shooting depends much on chance, but the best time for it is when after a cold storm the weather has cleared off warm. Windy weather is always favorable, if the wind is not too high. In England dark days are considered good ones for snipe, but that is not the rule in this country. The snipe rises toward the wind, therefore the shooter should move in the direction in which the wind is blowing. The birds will then rise directly in front of him and fly off to his right or left, so that he can get a cross-shot, which is considered the best. The time to shoot is just after the snipe rises, when the bird "hangs in the wind" for an instant. After that he flies off rapidly. When the birds are

abundant they may be hunted with any kind of a dog, or with none at all; but when they are scarce and the sportsman is obliged to go over much ground to get them, the dog should be a quick one. At the same time he must stand stiffly and not try to crawl in on the bird, and should be taught to stop or drop at the motion of his master's hand or the report of the gun. The dog should be encouraged to pass over unlikely ground as fast as possible, but where there are probably snipe he should be given his own time and not hurried.

Bay Shooting. In this method the sportsmen lie hidden in boats covered with reeds moored in the small pools left by the tide, where the birds come for food. On the margin are placed "decoys" or "stools," which are imitation birds made of wood, rubber, or tin. From twenty to forty of these are generally used. The sportsman imitates the note or whistle of the birds, till, seeing the decoys, they begin to settle among them, when he fires into a group. In this way the birds can be shot in large numbers. Sometimes the sportsman is concealed among bushes on shore instead of in a boat, but in any case he must keep perfectly still, and it is often necessary to wait thus for hours before the birds can be induced to come within shot.

Woodcock. (See C. C. T.). These birds hide during the day in marshy thickets, seeking for their food. They fly in a rising straight line till they reach the top of the bushes, and then horizontally till they light again, which they do by making a quick zigzag movement and then settling down at once. A knowledge of this method of flying and lighting is necessary to the sportsman in order that he may know where to find the birds. Some sportsmen walk along the outside of the covert, allowing their dogs to run in and flush the birds,

but others make it a rule always to follow their dog and never allow him to flush the birds. Summer woodcock rise more sluggishly than autumn birds, and are more easily shot.

Grouse. (See C. C. T.) Of the several grouse found in the United States the two principal ones are the ruffed grouse and the pinnated grouse or prairie chicken. Other species are the spruce partridge or Canada grouse, and the blue and the sharp-tailed, which are found in the West and the northwest. All the varieties have stout bills, short, feathered legs, and dark plumage. The ruffed grouse is wrongly called the partridge in New England and the pheasant in some of the Middle and Southern States. It frequents thick woods, and its color is so much like that of the ground that it is hard to see. The bird is wild and shy and has a way of running far ahead of the dogs and then rising, out of range of shot. When suddenly disturbed it rises with a loud whir and flies swiftly, often taking refuge in the branches of a tree. Grouse are often hunted with dogs of any kind, which flush the game, after which it is shot in a tree; but a more sportsmanlike method is to use only pointers or setters and to shoot the birds on the wing. The ruffed grouse is the most wary and cunning of all land game birds found in the northern States, and its successful pursuit requires much practice and skill on the part of the shooter. The birds are sometimes snared, but in most States this is forbidden by law, and it is considered unsportsmanlike. The pinnated grouse, generally called prairie chicken, or prairie hen, is numerous on the Western prairies and rarely found in timber. In dry weather on the prairie, where no water is to be found, it is often necessary to carry water with the hunting party for the dogs to drink.

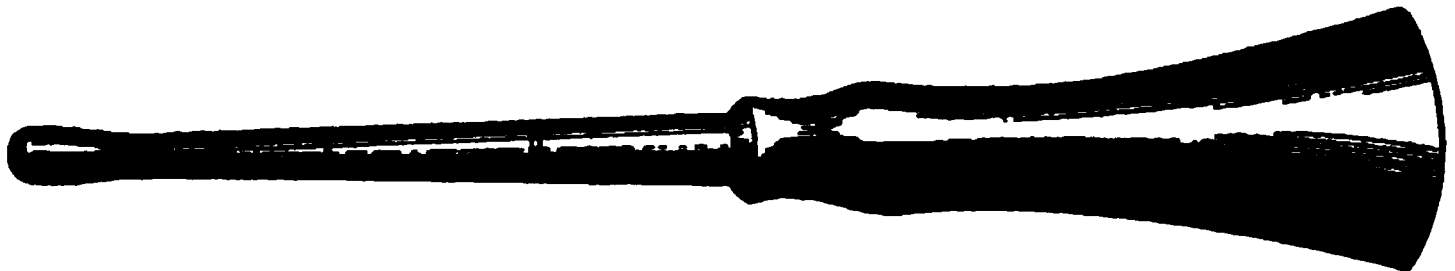
Quail. (See C. C. T.) This bird

is called the partridge in the Southern States, but there are no true partridges in this country. It is also commonly called Bob White, from the fancied resemblance of the call of the cock bird to these words. There are nearly fifty kinds of quail, all having a stout depressed bill, short tail, and brown plumage spotted with black and streaked with yellow. They are generally found in groups called coveys, in wheat stubbles and thickets at the edge of woods, near cultivated land. The birds are found in the Eastern and Middle States, but they are most numerous in the Southern States and the southwest. Quails are shy, and fly very swiftly. When they light they do not dart down nor wheel about, but fly gradually lower till they near the ground, when they bring feet and tail down together and then flap the wings. Unless they are seen to do this, it is unsafe for the hunter to assume that they have lighted. They often give out no scent for some time after they have dropped, and in this case it is best to note where they are, and return to them after trying other places. The quail is the most abundant and most widely distributed of the Eastern game birds. It is more easily brought to bag than the grouse or woodcock, and is game which the young sportsman may pursue with success. They are hunted with pointers or setters, which discover the birds by their scent and stand on point until the sportsman comes up, flushes the quail, and shoots them flying.

Wild Fowl. The wild water-fowl hunted as game-birds are the swans, geese, and ducks. They are migratory, going to the far North in spring, to breed, and returning to the far South in autumn. The great routes of migration are along the Atlantic and Pacific coasts, and through the Mississippi Valley. On their passage to and from their summer homes, they stop to rest

and feed in the bays, lakes, ponds, and streams, wherever there is food for them. Wild rice and wild celery are favorite articles of food with wild fowl; it is the wild celery that gives their fine flavor to canvas-back and redhead ducks, two varieties that are considered great luxuries for the table. Sportsmen sometimes plant wild rice in waters where there is no natural food to lure the ducks. In winter wild fowl abound in southern waters. One kind of wild goose is called Brant. The kinds of ducks most valued by sportsmen are Canvasbacks, Redheads, Mallards, Teal, Pintail, and Woodduck. Ducks abound especially on the shores of lakes in the Northern States, the New Jersey coast, Delaware and Chesapeake Bays, Currituck Sound, the Mississippi Valley, and the lakes

and bays of the Northwest, such as Puget Sound, and the Willamette and Columbia Rivers. Wild fowl are hunted in a variety of ways, sometimes by stealing upon them while they are feeding or resting, but usually by shooting them as they fly from one place to another. In the latter case the hunter must carefully conceal himself by some form of screen or blind, as it is called. One favorite method, adopted when the fowl fly to and from their feeding grounds, is for the hunter to station himself, well concealed, in a point of land over or near to which they fly, and to shoot them as they pass. A common device is to put out decoys, which are images of ducks, made of wood or other material. These are anchored in the water, and are so arranged as to appear to be



Turkey Call.

alive; the ducks, seeing them, fly to join their company, and are shot before alighting on the water, or at rest. Sometimes tamed wild ducks are used as decoys, and call to their wild fellows. The gunner often uses a peculiar whistle or duck-call, with which he imitates the notes of the wild fowl, and attracts their attention to his decoys. In the Chesapeake Bay and elsewhere duck hunters lie in sink-boats, which are sunk in the water until their edges are level with the surface, and shoot as the birds fly over. Another form of blind, called a battery, is a box sunk in the sand or in shallow water, where the gunner lies concealed. Sometimes trained dogs, of the breed known as the Chesapeake Bay dog, are made to run up and down the shore, and by their

antics excite the curiosity of the birds, which approach to see what the dogs are doing. This is called "toling." Ducks fly very swiftly and they are wary birds. Duck-shooting requires much skill, and is often attended with hardship and exposure.

Wild Turkey. This fowl abounds in most of the Southern and some of the Western States, and is usually decoyed by using a "call" or whistle, imitating the noise made by the bird. Turkey calls of several kinds can be bought of dealers in sporting goods, but some sportsmen can make the call without their aid. The sportsman usually hides himself in a thicket and makes the call till a turkey, attracted by it, comes within range. Turkeys may be hunted also without the call. They

leave a trail when walking, so that they are easily tracked by a dog, but they are so timid that it is hard to get within range in this way. They are often shot at their roosts, the hunter surprising them at dawn before they have flown.

The Upland Plover, or Bartram's Sandpiper. This bird frequents inland pastures, and is much esteemed as food. It is very shy and difficult to approach except by some trick. In Rhode Island it is hunted from two-wheeled chaises, in the bottom of which the huntsman sits, while the chaise drives around the bird in gradually narrowing circles. The huntsman has his leg on the step ready to spring out and fire the moment the bird rises. Success depends largely on the skill of the driver. Another trick is to use trained ponies, which move closer and closer to the bird while feeding, the huntsman standing concealed by the animal's forelegs and shoulder. Some sportsmen build houses of boughs, in which they wait for the birds to alight near by.

The Rail. This small bird frequents the rice flats on the seashore of the Southern States, and the borders of tidal rivers like the Delaware, or the New Jersey flats. The rail runs swiftly, and though it has a strong scent, can with difficulty be forced by dogs to take flight. The birds fly slowly, and for short distances. The best method of hunting them is from boats, at flood tide, the birds being forced to take wing by running them down. They must be killed at the first shot, as otherwise they dive, hide in the thickest reeds, and are very hard to find. The skill lies more with the man who "poles" or pushes the boat than with the huntsman, for the birds fly so slowly that they can hardly be missed by any one who is a fair shot. One sportsman has sometimes killed more than one hundred of these birds during a single tide. Rail-bird

shooters also find on the same grounds the reed-bird or rice-bird, which is the bobolink of northern meadows in spring and summer. In September the reed-birds are found in immense numbers in the wild-oat fields; and many thousands of them are killed for market. In the South, where they are known as rice birds, they do great damage to the rice crops.

Pigeons. (See C. C. T.) These birds, once so numerous, have now almost disappeared from the eastern United States, owing to the way in which they have been killed in pigeon-shooting contests (see SHOOTING).

Cranes. (See C. C. T.) Cranes are found in the South and West. Whooping cranes are hunted in the Mississippi Valley for their plumage. In Oregon the sandbill crane is called "Chinese Snipe," because it is eaten by the Chinese.

Deer. The different kinds of deer are described in C. C. T. They are found chiefly in wild regions. In the Eastern States, the best regions for deer-hunting are the Adirondack Mountains, the Maine woods, and the western part of Pennsylvania. They abound in the Blue and Alleghany Mountains, in Arkansas, Michigan, the Rocky Mountains, and on the Pacific slope, but they are being killed so rapidly that there is danger that they may be exterminated. Many States have passed laws regulating deer-hunting. Deer are hunted in various ways. In the South the sportsmen usually ride on horseback, and dogs are put on the trail, who chase the deer past the huntsmen. In some parts of the South there are hunting clubs, organized expressly to hunt deer in this way. In Georgia and Florida, deer are often shot by torch-light in the swamps, and in Kentucky and Tennessee hunting parties often camp in the woods for several weeks. In Arkansas the game is hunted chiefly on foot, the

sportsman being careful not to get to windward of the deer. Sometimes the hunter, by pinning a red handkerchief across his breast, so excites the curiosity of the deer that the animal keeps still until he is very near him. The deer in the Adirondacks are fast decreasing in number, though the time for killing them is limited by law. The methods used there are still-hunting over freshly fallen snow, the hunter tracking the deer until within range; "Jack hunting," where a lantern called a "Jack" is carried on a pole in the bow of a boat, or on the sportsman's head, to dazzle the deer and make him stand still for a moment; and hunting with dogs. In the last-named method, the dogs drive the deer past the hunter, who is stationed on a "runway," or drive it into the water where it is shot swimming by huntsmen from the shore or in boats. Rifles and shotguns loaded with buckshot are used for deer-hunting.

Bears. The bear is described in C. C. T. Bears are found throughout the United States in wild places, such as the Catskill and Adirondack Mountains in the East, the mountains of North Carolina and West Virginia, the swamps of South Carolina, Georgia, and Florida, the "bottom lands" of Arkansas, and the mountains and forests of the far West. They are usually hunted with rifles and by the aid of dogs. The black or brown bear, unless it be a mother with cubs, is apt to be inoffensive till wounded. The grizzly, though formidable, is hunted for sport quite extensively.

Fox. The fox is described in C. C. T. He is found wild chiefly in the Southern States, especially around the Blue and Alleghany Mountains. In some parts of the country, especially in New England, he is hunted with a gun like other wild animals, hounds being employed to drive the game to the hunter, who stations himself where the fox is

likely to pass; but in some other parts of the country sportsmen think that the proper way to hunt him is with a pack of hounds. The hounds follow the trail of the fox till they overtake and kill him, and the huntsmen follow on horseback, each striving to be "in at the death." The fox adopts many kinds of tricks to deceive the dogs and throw them off the scent, and the trail often leads over very rough country, so that to follow it requires great skill in riding. In some of the Southern States large packs of hounds are kept for fox-hunting, and women as well as men are fond of the sport. There are fewer foxes in the Northern States, but near some of the large cities are associations called "hunts" for the purpose of hunting the animals. Where foxes cannot be found, one is brought from a part of the country where they abound, and sometimes instead of following a fox, the hounds are made to trace the scent of a bag filled with anise seed, which has been dragged over the ground. The first one of these hunting clubs was formed in Hackensack, N. J., in 1875. Some of the chief ones are the Rockaway Hunting Club and the Meadow Brook Hunt on Long Island; the Essex County Hunt in New Jersey, the Radnor and Rose-tree Hunts near Philadelphia, the Myopia near Boston, the Elkridge Hunt of Baltimore, and the Prince George County Hunt, most of whose members live in Washington, D. C. These hunts, in addition to the usual society officers, have a Master of the Hounds, who has charge of the horses and dogs, and appoints places for the meets.

Hares or Rabbits. Hares are usually hunted with dogs, which drive out the game to the hunter. The beagle is the best dog for this purpose. In the West the large hare, known as the jack rabbit, is coursed with grayhounds, which chase the game on the prairies, the huntsmen

following on horses. The Jacks, as they are called, are exceedingly swift runners, but are often overtaken by the hounds.

Squirrels. Of all game animals no one furnishes more sport to the young hunter than does the black or gray squirrel. For squirrel-hunting a dog is useful to point out the tree where the game is in hiding; and for this purpose almost any dog with a good nose will do. The proper weapon is a small bore-rifle, though the shotgun is often used; but the rifle calls for the most skill and gives better satisfaction in every way. Other animals hunted in the United States are the Raccoon, the Wolf, the Lynx, the Cougar, and the Opossum, and sometimes the Alligator and the Eagle. These, all of which are described in C.C.T., are usually shot with the rifle.

Game Laws. Most States have passed statutes for the preservation of game.

Methods. In New York deer cannot be taken by traps, spring-guns, or similar devices. They must not be hunted with dogs in St. Lawrence and Delaware counties, and in other counties only in certain prescribed seasons. It is forbidden to kill fawns. In New York, New Jersey, and Pennsylvania, wild fowl must not be killed with swivel or punt-guns, or by any other device except such a gun as is ordinarily raised to the shoulder and fired. In New York it is unlawful to hunt wild fowl at night or with a "floating battery" or to use a decoy more than twenty rods from shore, except in certain bays in Long Island, in Lake Ontario, and in Hudson River below Albany. In New York it is unlawful also to shoot wild fowl from any steam or sailing vessel. Game birds in general may not be trapped in any of these States. In New York hares and rabbits may not be hunted with ferrets, except in orchards or nurseries by their owners. In New Jersey non-resi-

dents of the State are not allowed to hunt in certain counties without becoming members of one of the Game Protective Societies. Robbing the nests of wild birds or killing song-birds is unlawful in all the States mentioned.

Trespassing. In most cases it is necessary for the sportsman to hunt on land belonging to other people. The best plan is to obtain permission, which in this country is usually given readily, but often huntsmen have become so accustomed to kill game in a certain spot without hindrance, that they think they have a right to do so. Courts, however, have decided that, no matter what the custom is, sportsmen cannot claim a legal right to hunt on other people's land, nor even to stand on the public road and shoot over the fence, or send in a dog. In any such case the sportsman is really trespassing, and although the owner of the land usually does not care, the sportsman should always remember that the owner has a right to order him to leave. If he refuse, and do not leave after a reasonable time, the owner may then use necessary force, but not till then. The owner has no right, for instance, to set a savage dog on the trespasser whom he finds on his land. In some States special laws have been made against sportsmen who enter land when they are forbidden by a printed and posted notice.

The owner of a piece of land does not own the live game on it, in the same way that he owns his horses, dogs, or chickens, but he has the exclusive right to kill it so long as it is on his land. This right is called his property in game. But game is the property of no particular person till he has killed it. The question as to who owns game killed by a trespasser has never been settled in the United States.

Some States allow hunting privileges to its own citizens which they deny to those of other States.

Their right to do this has been denied by some people, but the Supreme Court of the United States has decided that it is allowable to make such laws with regard to oyster-fishing, and probably all similar laws would be supported in like manner.

Seasons. Most of the States have laws regulating the times when the several species of game may be killed. See Tables following. The black lines show months the game is "in season." A short black line in the columns means first half of month, when printed toward the left; and last half, when toward right. Figures to the left of short lines mean in season from that date, and to right, to that date. These times are only approximately correct, as legislatures are constantly changing them. The sportsman to be absolutely safe should therefore make special inquiry in each case. The intent of these laws is to protect the game during its breeding season, so that birds may not be killed while nesting and rearing their young nor before the young birds shall have grown large and strong enough to care for themselves. The time when game may lawfully be killed is called the "open season," and during that period the game is said to be "in season." The period when it cannot be killed is called the "close season," and the game is then said to be "out of season." In most States it is forbidden also to have in possession or to sell game in the close season.

History. The pursuit of wild birds and animals was probably undertaken at first to obtain food, or for protection; but it must have begun very early to be thought of as a sport, for the oldest nations whose history we knew so considered it. In the great eastern kingdoms the Kings and their courtiers were very fond of the sport, and the sculptures on the ruins of Nineveh and other great cities of Assyria and Persia often represent hunting scenes. The

kings of Persia owned many vast hunting parks, in which were kept wild animals. These parks were called by the Greeks *paradeisos*, from which we get our word Paradise. The Greek and Roman legends are full of hunting stories. The Greeks were fond of the sport, and Xenophon and other Greek authors wrote books about it, from which it appears that hares, boars, stags, lions, panthers, and bears were among the game hunted.

In Egypt the huntsmen formed a class by themselves, either hunting on their own account, or acting as the attendants of the nobility. Sometimes trained lions were employed by them instead of dogs, just as the cheetah, or hunting leopard, is used in India at the present day, and the huntsman sometimes rode in a chariot, discharging arrows at the game when he came within range. Allusions in the Bible to huntsmen and their nets and snares show that in Palestine trapping was a favorite mode of securing game; but spears and arrows were also sportsmen's weapons. The horse and dog were not used in hunting by the Jews. King Herod was a successful huntsman, and is said to have killed forty boars, wild asses, and deer in a single day. The Romans viewed hunting, like other sports, less as an occupation for gentlemen than as a spectacle, and exhibitions of hunting were often given in the great amphitheatres. Sometimes the beasts were killed by attendants, and sometimes the people were allowed to rush in and carry away what they could get, in which case no dangerous animals were brought in. Sometimes large trees were taken up and planted in the arena, to make it look like a forest. In one of these hunting spectacles, which were called *Venationes*, there were 1000 ostriches, 1000 stags, 1000 boars, 1000 deer, and numbers of wild goats, wild sheep, and other smaller animals

[illegible]

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	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
Pennsylvania (gray and black) Pike County.....												15
Elsewhere												15
Rhode Island (gray).....												
Water Animals.												
Iowa (Beaver, Mink, Otter, Muskrat)												
Maine (same, with Sable and Fisher).												
Montana (Beaver, Otter, Fisher)												
Nebraska (Mink and Muskrat).....												
New Hampshire (Mink, Beaver, Sable, Otter, Fisher).....												
Ohio (Muskrat, Mink, Otter).....												
Utah (Beaver, Otter).												
Vermont (Mink, Beaver, Otter, Fisher).....												
Wisconsin (Otter, Mink, Martin, Muskrat, Fisher).....												
Plover.												
Dakota												
District of Columbia.....												
Maine.....												
Massachusetts.....												
Missouri												
Nevada												
New Hampshire.....												
New Jersey.....												
New York, Queens and Suffolk Counties							10 15					
Pennsylvania.....												
Rhode Island												
Tennessee, Montgomery and Cheat-ham Counties.												
Rice Bird.												
Connecticut.....												
Reed Bird. See RAIL.												
Elk, Moose, Antelope, Buffalo. See DEER.												
Robin, Lark, Bobolink.												
Connecticut.....												
Gull, Tern, Sea Swallow.												
Massachusetts.....												
Starling.												
Mississippi												
Mountain Sheep.												
California, Siskiyou County.....												
(Elsewhere prohibited.)												
Colorado. Hunting prohibited till 1895.												
Oregon.....												
Washington.....												
Elsewhere, where found, included with DEER.												

Hunting has always been a more favorite sport with the northern than with the southern nations of Europe. The early inhabitants of Britain are said to have kept good hunting-dogs, and under the Saxon kings the sport was reduced to a system. Alfred the Great was an expert huntsman when a boy of twelve. The love for the sport was carried to such an extent that laws had to be made prohibiting hunting on Sunday, and forbidding monks

to hunt in the woods with dogs. People were also forbidden to interfere with the king's hunting, but any man could hunt where he chose.

When the Normans conquered England, they brought with them much finer horses and hounds than those the Saxons had used, but they made hunting a privilege of the nobles alone, and passed cruel laws forbidding the common people to indulge in it. These laws, called

Forest Laws, drove many of the Saxons into rebellion, and some, like the famous Robin Hood (see C. P. P.), became outlaws. These laws, little by little, were removed; yet even at the present day, the law in England is very severe against hunting on land belonging to another person. Such hunting is called poaching, and the game-keepers who have charge of the game on large estates are obliged to keep constantly on the watch for poachers, who are generally punished severely. In this country the owners of enclosed ground usually allow people to hunt there, but they have always the right to forbid it, as explained above.

HUNT THE RING. See HUNT THE SLIPPER.

HUNT THE SLIPPER, a game played by any number of persons, with an ordinary slipper. The players sit on the floor in a circle, excepting one, who stands in the middle. Those in the circle pass the slipper quickly around the ring either behind their backs or beneath their bent knees, and the one in the middle tries to find out who has it at every moment. If he can call the name of the person in whose hands it is, that person must take his place. It is usual for the players to pretend to pass the slipper when it is not in their hands, and to try in many ways to mislead the one looking for it. Instead of a slipper a ring is often used, strung on a long cord, on which it is slid along from one player to another. If the players keep their hands moving along the cord, it is very difficult to tell where the ring is. In this form the game is called Hunt the Ring.

In France Hunt the Ring is called *Le Furet* (The Ferret), and the player within the circle is named the Hunter. During the game the players sing a song, beginning:

"Il court, il court, le Furet,
Le Furet du bois, mesdames;
Il court, il court, le Furet,
Le Furet du bois joli."

In English this is

"He runs, he runs, the Ferret,
The Ferret of the woods, ladies;
He runs, he runs, the Ferret,
The pretty Ferret of the woods."

HUTCHINSON FAMILY, a game, or trick, played by any number of persons. Those who know the game retire to an adjoining room and are supposed to personate the Hutchinson family, to whom the others are brought in one by one to be introduced. The "family," who all stand in a row, imitate, as exactly as possible, whatever the guest says or does, until he sits down, when he joins the family, and another person is brought in. Sometimes, when the guest understands the joke, he can turn it on the members of the "family," by doing something difficult to imitate.

HYDROCHLORIC ACID, Experiments with. Hydrochloric acid is a gas made up of hydrogen and chlorine (see C. C. T.). It is called also muriatic acid. It is sold in drug-stores in liquid form, the gas being dissolved in water. If this liquid be heated it will give off the gas again. The liquid may be held over an alcohol lamp, in a bottle or flask from which a delivery-tube leads to the bottom of a jar. The gas, being heavier than air, will stay in the jar till it is full. The gas may be made also by gently heating common salt and sulphuric acid in a flask. Pieces of rock salt the size of a pea should be used, for with ordinary pulverized salt the action is too quick, causing the mixture to froth. The gas is collected as before. It is transparent, so the only way to tell when the jar is full is to hold a strip of blue litmus paper near the top. (See TEST PAPERS.)

EXPERIMENTS.

1. *The Fountain.* This is made in the same way as the AMMONIA fountain, except that the water must be colored with blue litmus, and

will turn red as it enters the upper bottle. The result is explained in the same way, hydrochloric acid gas having a great liking for water.

2. Fill a long test-tube with the dry gas, and invert it over a saucer of mercury, letting the mouth of the tube dip below the mercury. Put a bit of ice into the tube by pushing it under the mercury. The ice and gas will both disappear, and the mercury will rise in the tube. This is because the gas likes water so well that it forces the ice to melt, and is then dissolved by the water which is made. The pressure of the outside air then forces the mercury up into the tube to take the place of the dissolved gas.

See also Experiment 3 under AMMONIA.

HYDROGEN, Experiments with. Processes and things merely alluded to in this article are freely explained in that on CHEMISTRY, EXPERIMENTS IN. Hydrogen gas is described in C. C. T. To make it, bore two holes in the cork of a wide-mouthed bottle, like those in which pickles and jam are sold, making sure that the cork is sound and tight. Through one of the holes put a "thistle-tube," and through the other a delivery-tube, the end of which is bent to collect the gas over water. The thistle-tube must reach nearly to the bottom of the bottle, but the delivery-tube must end near the top. Into the bottle put about a dozen small pieces of zinc. Scraps of zinc can be bought at a plumber's, and cut up with a pair of shears. Each piece should be bent or twisted a little, so that it will not lie flat on the bottom of the bottle. Instead of zinc, nails or scrap-iron may be used. The cork with its two tubes must now be put in place. Be sure that it is tight (hydrogen being quite explosive); blow into the delivery tube till the water rises into the funnel of the thistle tube, and then stop up the end of the delivery-tube with the

tongue. If the water stays at the same height in the other tube the bottle is tight, if not, the cork must be covered with sealing-wax. When all is tight, half fill the bottle with water, by pouring it through the thistle-tube. Then pour in sulphuric or hydrochloric acid slowly, half a tea-spoonful or so at a time, until bubbles begin to rise pretty briskly from the zinc. Gas will soon bubble up into the receiver. If it does not, pour in more sulphuric acid, and if it still refuses to appear it is probable that the cork is not tight, and that the gas is escaping into the air. The first jarful of hydrogen made must be thrown away, for it is mixed with the air which was in the bottle to begin with, and a mixture of hydrogen and common air is very explosive. When one or more jars of pure hydrogen have been collected, the experiments de-

Making Hydrogen.

scribed below may be tried with it, or a large quantity may be made and stored in a gas holder for future use. The hydrogen made in this way comes from the acid used (see ACID in C. C. T.) The other substances in the acid prefer the zinc or iron to the hydrogen, and so let it go and unite with the metal instead. The substance so formed is sulphate of zinc or iron, if sulphuric acid be used, and chloride of zinc or iron, if the acid is hydrochloric. Any of these dissolves in water un-

less there is too much acid in it, when it sticks to the metal and stops the action. For this reason it is not well to put in too much acid.

EXPERIMENTS.

1. Holding a jar, in which hydrogen has been collected, mouth downward, touch a lighted match to it. If the gas is pure, it will burn quietly. Repeat the experiment, holding the mouth of the jar upward, the gas will burn quickly with a high flame. This is because hydrogen is lighter than air and so escapes and mixes with it when the opening of the jar is uppermost.

2. A jarful of hydrogen may be poured *up* into an empty jar. That the gas has really been poured into the empty jar may be proved by touching a match to it.

3. Remove the end of the delivery-tube and substitute a glass jet. If the hydrogen is pure it may be lighted at this jet, and will burn with a very pale blue flame. This experiment must not be tried till several jars of gas have been collected, for if the gas in the bottle is impure it will explode. It is a good plan to wrap a cloth around the bottle, so that if there be an accident broken glass will not be thrown about. A jet of hydrogen burning thus is called the "Philosopher's Candle."

4. Hold a glass tube twelve or fifteen inches long and about one and a half inches wide over the flame of the Philosopher's Candle, and move it up and down. A position will be found where the tube will give out a musical sound. If it does not, the size of the jet and tube are not fitted to each other, and one or the other should be made larger or smaller. The sound is caused by a great number of little explosions, so close together that they form a musical sound. (See SOUND, C. C. T.)

5. Blow soap-bubbles with the gas, as described in the article SOAP-BUBBLES. The gas must be drawn

from a gas-holder for this purpose. If the bubbles be blown with a mixture of hydrogen and air, or hydrogen and OXYGEN, each will explode with a loud report, instead of burning, when touched with a lighted match.

HYDROSTATIC BELLOWS. A scientific toy, made as follows: Cut out two pieces of board of the same size and shape, either square or round, and about two feet in diameter. Connect them by nailing leather to their edges, so that when it is stretched they will be about six inches apart. The apparatus must be water-tight. Bore an auger-hole in one piece of board, and fit in it tightly the end of a piece of lead-pipe five or six feet long. Place the bellows on the ground with a heavy weight on it, so that the boards will be pressed together. Support the pipe upright and pour water into it through a tin funnel. The upper board of the bellows will rise, raising the weight. If the experimenter stand on the bellows, he can raise his own weight by pouring water into the tube. The reason is, that in fluids pressure is carried equally in all directions. If the pipe is one square inch in section, then every square inch of the bellows-boards is pressed on by a weight equal to the water in the pipe; and if the bellows be large, the entire pressure may thus amount to several hundred pounds.

HYGROSCOPE, an instrument to show whether the air is moist or dry. One of the simplest is made by taking a hair or piece of cat-gut a foot or two in length, and hanging it by one end to a nail in the wall, tying to the other end a small weight, just sufficient to stretch the hair tight. Hair or cat-gut will lengthen by absorbing moisture from the air, so the hair becomes longer in moist than in dry weather. To show a slight change in the length of the hair, a splinter of wood is fastened at one end to the

hair near the weight, and is pivoted on a pin very near that end. A slight movement of the end fastened to the

hair, will thus cause a greater one in the other end. The

illustration shows one a little more carefully made. Fastened to the upper part, *d*, of the frame is a screw *a b* to tighten the hair, *c* is the hair, and *p* the weight. To relieve it of the tension caused by the weight, the hair is passed over a pulley, to which the pointer is attached. A little thermometer is fastened to the side of the frame.

Hair Hygroscope. This kind of hygroscope can be made also of twisted cat-gut, which untwists by absorbing moisture. The little houses with figures of a man and woman, one of whom appears in moist and the other in dry weather, are made in this way.

Wet and Dry Bulb Thermometer. This form of hygroscope consists of two thermometers hung side by side. Around the bulb of one is tied a piece of soft cloth, the end of which dips into a cup of water. The cloth soaks up the water, and keeps the bulb continually wet. The evaporation of the water on the bulb keeps it cooler than the other, so it always stands lower. On very dry days

the water evaporates fast, and the wet bulb thermometer stands much lower than the other, while on

Wet and Dry Bulb Thermometers.

damp days the water does not evaporate so quickly, and so it stands only a little lower. Hence the instrument is used to tell whether the air is dry or damp.

Phial Barometer. This is really a kind of hygroscope, because it does not measure the pressure of the air, but shows only whether it is dry or moist. Cut off about half of the neck of a common glass phial (see CHEMICAL EXPERIMENTS, directions for glass-working) and nearly fill it with water, which may be colored if desired. Place the finger over the mouth of the phial and invert it; the water will not run out even when the finger is removed. Suspend the phial, neck downward, by a string. In dry weather the under surface of the water is either level or concave, but in damp weather a drop appears at the mouth of the phial, and keeps enlarging till it falls. This is caused by the deposition of moisture from the air.

I

ICE, Experiments with. In a room below the freezing point place a lump of ice, whose ends rest on two chairs, tables, or boxes, and hang a weight of several pounds over the ice by an iron wire. The wire will cut gradually through the ice, but the block will freeze together again above it, so that in time the

weight will fall to the floor, the wire having cut completely through the block, which nevertheless remains sound and whole.

ICE-BOATS. The present ice-boats, or yachts, as they are sometimes called, are made on the plan shown in Figs. 1 and 2, of two beams crossed, and braced with iron stays.

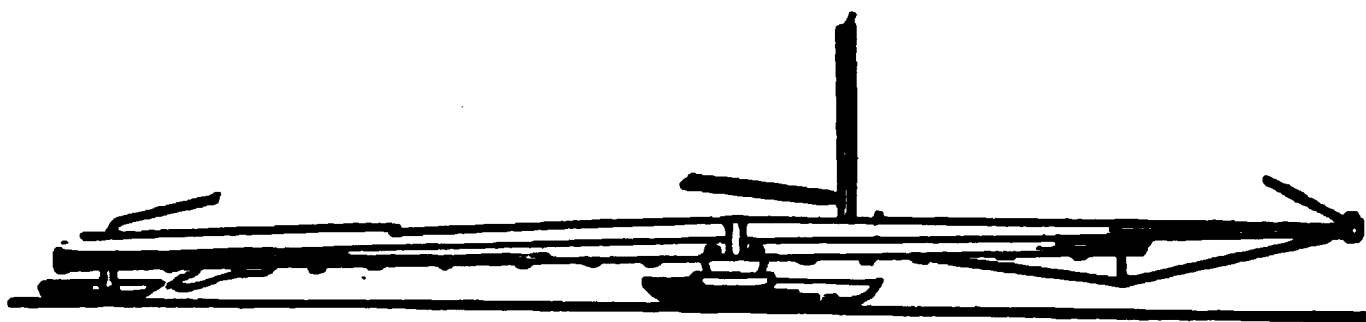


Fig. 1.

The runners, three in number, are at the ends of the cross-beam (called the "runner plank") and at the rear of that running lengthwise (called "centre timber"). On the forward end of the centre timber is bolted the bowsprit. The rear runner serves as a rudder. The forward runners are fastened by a bolt on which they can rock forward and backward. There is one mast, which is placed slightly in advance of the cross-plank. An oval box, holding two persons, is fastened just above the rudder; except for this the boat is merely a frame. The largest ice-boats are 50 to 60 feet long, and 25 or 26 feet wide. They are rigged as sloops, cat-boats (see Fig. 3), or with a lateen sail (see SAILING). Ice-boats may sail faster than the wind, as shown by Fig. 4:

Suppose the wind to be blowing in the direction of the arrow at the rate of twenty miles an hour; then, if A B is a mile, the boat cannot sail that distance directly before the wind in less than three minutes; but

the friction of the runners on the ice is so slight, that it will sail along A C in almost the same time. As A C is about two miles, the boat would be going twice as fast as the wind. Ice-boats thus attain wonderful speed. On February 12, 1879, the "Lucille" sailed from Poughkeepsie to New Hamburg, on the Hudson River, nine miles, in seven minutes and ten seconds. At another time the "Snow Flake" is said to have made the same distance in seven minutes, and in 1882 the "Haze" did the same, making at one time two miles in one minute. Many similar instances of great speed are related, but it is hard to get an official record, for ice-boats go fastest when least expected, and the time made in regular races, as shown below, is far slower than that just given, though still very great.

The sails of the boat are set nearly fore and aft, and the boat is managed almost entirely by the rudder, the speed being so great that the helmsman has no opportunity to

change the position of the sail. If the sail must be reefed, the boat is

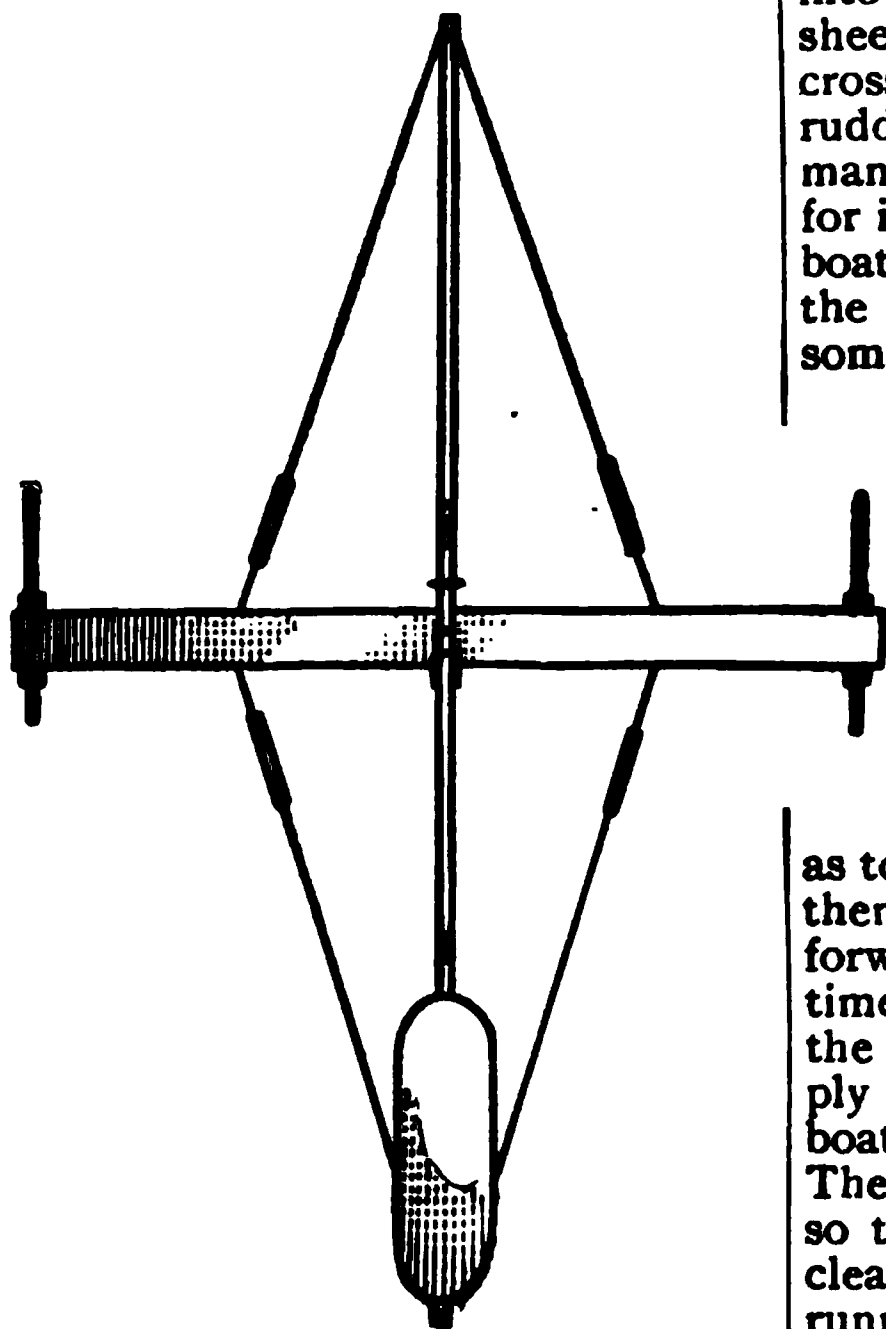


Fig. 2.

brought into the wind and the crew disembark to reef it. The boat is stopped usually by bringing her with

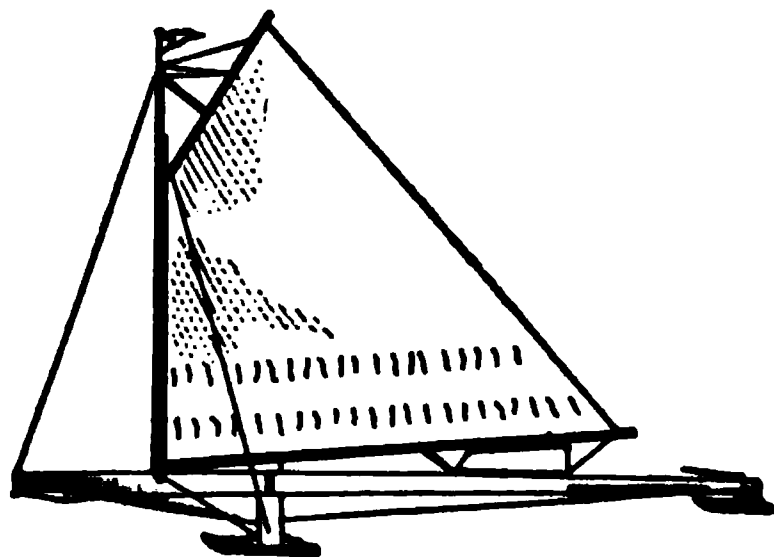


Fig. 3.

her head to the wind, and then slackening the sheet. Many ice-boats have a brake which can be

thrust down to act as a drag. The boat is anchored by bringing her into the wind, loosening the jib-sheets, and turning the rudder crosswise. The ice boat obeys her rudder very easily, and the steersman must be always on his guard, for if he turn it too suddenly the boat will spin around, throwing the crew out. To cross a crack, some sailors first head the boat so

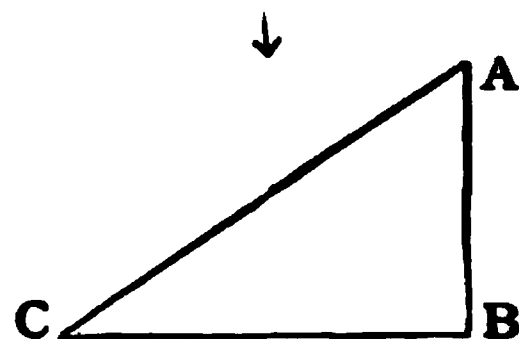


Fig. 4.

as to "spill" (or lose) the wind and then run over the crack so that both forward runners cross it at the same time; and some disembark and help the boat over. Others would simply slack both sheets and let the boat's momentum carry her over. The wind often forces the boat over so that the weather-runner is lifted clear of the ice, leaving only the lee-runner and the rudder.

The boat is then said to "rear," and must be eased by bringing her into the wind, if the boat is beating to windward. One or two men often stand on the windward runner, to keep it down. The greatest speed, running free, is made by steering across the wind till a maximum velocity is reached, and then steering down the wind without slacking the sheet. The momentum will carry the boat faster than the wind for some distance, when she must again be brought up and headway regained. The yachtsman often wears coverings of wire gauze over his eyes and mouth to keep out flying snow.

The strain on the timbers of an ice-yacht makes it necessary that they shall be perfect in grain and well seasoned. The runners are

Ice-boats on the Hudson.

made of iron or steel. Iron runners wear at first, but by use acquire

boats have two sets of runners, sharp ones for smooth ice and strong winds, and duller ones for rough or soft ice.

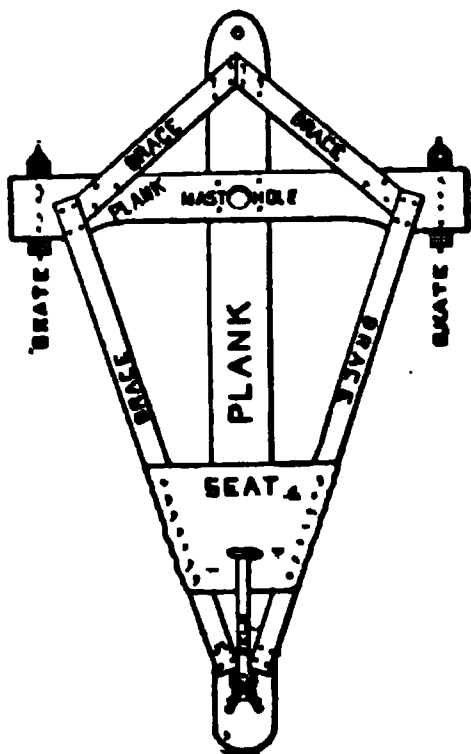
A Tom Thumb ice-boat holds only one person, and can be made by nailing boards together as in the diagram. The runners are made of skates. The rear one, or rudder, is screwed to the end of a stout wooden upright which passes through a hole at the rear of the main plank. To this upright a horizontal handle is fastened, forming the tiller. The steersman sits just forward of the tiller with his feet on the cross-plank. The rudder may be omitted, the rear skate being fixed, like the others; but in this case the steersman must have on skates and steer with his feet. Any simple sail may be used.

Crossing a Crack.

what is called a "water polish," the surface becoming very hard. Many

The chief ice boat clubs in the United States are on the Hudson River and the Shrewsbury River in New Jersey. A silk challenge pen-

nant, thirty feet long, is raced for every year. The winner can be challenged in the following year by



Tom Thumb Ice-boat.

any organized club in this country or Europe. A list of winners of the pennant, with their times, is given in the appendix.

The following are the chief sailing rules of the Hudson River Ice Yacht Club:

RULE I.—The following sailing rules and regulations shall govern and control all the regattas and all the races of this Club, and all contests sailed under its auspices, unless otherwise specified between parties making a match.

RULE II.—*Classification.* Yachts shall be divided by sail area into four classes as follows: First class, measuring 600 square feet of sail area and over; Second class, measuring 450 and under 600 square feet; Third class, measuring 300 square feet and under 450; Fourth class, measuring less than 300.

RULE III.—*Objections.* If any objection be made with regard to the starting of any ice-yacht in a race, such objection must be made in writing to the Regatta Committee at least one hour before a regatta.

RULE IV.—*Entry of the Yachts.* Unmeasured or unrecorded yachts,

or yachts in arrears to this Club, cannot be entered for any race.

RULE V.—*Touching Buoys, etc.* An ice-yacht touching any mark, boat, or buoy, used to mark out the course, shall forfeit all claim to the prize, except as in cases specified in Rules VII, IX, X.

RULE VI.—*Rule of the Road.* When two yachts have to cross each other on the opposite tacks, the one on the starboard must invariably keep her course, and the one on the port tack must keep away and pass to leeward, or tack short, when the smallest doubt exists as to her being able to weather the other. All expenses of damages incurred by yachts on opposite tacks running on board each other, fall upon the one on the port tack, unless the one on the starboard tack has kept away with the intention of passing to leeward, in which case the expense of damage falls upon the yacht on the starboard tack, because, by her keeping away, she may have prevented the other passing to leeward. Should a vessel on the port tack attempt to weather one on the starboard tack when it does not seem possible to do so, the latter, rather than keep away, should put her helm down. Nothing should induce a vessel on the starboard tack to keep away.

RULE VII.—*Courses.* Any ice-yacht purposely bearing away or altering her course to leeward, and thereby compelling another ice-yacht to bear away to avoid a collision, shall forfeit all claim to the prize, and pay all damages that may ensue—unless, when two ice yachts are approaching the windward shore, a buoy or stake boat, together with a free wind, and so close together that the weathermost cannot bear away clear of the leewardmost, and by standing further on would be in danger of running on shore, or touching a buoy or stake boat; then such leewardmost ice-yacht, on being requested to bear away, is imme-

diately to comply, and will forfeit all claim to the prize by not doing so. The weathermost ice-yacht must, however, bear away as soon as the one she hails, if she can do so without coming into contact.

RULE VIII.—*Rounding Buoys, etc.* When rounding a mark, boat, or buoy, the ice-yacht nearest thereto is to be considered the headmost ice-yacht; and should any other ice-yacht in the race compel the ice-yacht which is nearest to any mark, boat or buoy, to touch said mark, boat, or buoy, the ice-yacht so compelling her shall forfeit all claim to the prize; her owner shall pay for all damages that may occur; and the ice-yacht so compelled to touch a mark, boat, or buoy, shall not suffer any penalty for such contact.

RULE IX.—*Courses.* Ice-yachts going free must invariably give way for those by the wind on either tack.

RULE X.—*Courses.* When two ice-yachts (by the wind) are approaching the shore, a mark, boat, or buoy, together, and so close to each other that the leewardmost cannot tack clear of the weathermost, and by standing further on would be in danger of running on shore, or touching a mark, boat, or buoy; such weathermost ice-yacht, on being requested to put about, is immediately to comply, and will forfeit all claim to a prize by not doing so. The leewardmost ice-yacht must, however, tack at the same time as the one she hails, if she can do so without coming into contact.

RULE XI.—*Pushing.* Unfair pushing is strictly forbidden in any race for a prize; any ice-yacht infringing upon this Rule, in the opinion of the Regatta Committee, shall forfeit all claim to the prize.

RULE XII.—*Ballast.* No ice-yacht shall increase or diminish ballast during a race.

RULE XIII.—*Time of Performance.* SECTION 1. In case the

distance assigned for the race shall not have been performed in the time specified by the Regatta Committee, the race shall be repeated at such time as the Regatta Committee may appoint.

SEC. 2. If any ice-yacht, however, shall perform the distance in time specified for her class, it shall be deemed a race for that class.

History. Ice-boats have been used in the north of Europe for several centuries, but they have never been brought to such perfection there as in the United States. In Holland and Russia they are hardly more than sleds with sails, and sometimes they are sail-boats mounted on runners. The principal improvements in ice-boat building have been made by the clubs on the Hudson River, the first of which was formed in Poughkeepsie, N. Y., in 1861, but the sport is practised on harbors, lakes, and streams throughout the northern United States and in Canada.

IDENTIFICATION, GAMES OF, games in which part of the players try to guess the names of the others from the appearance of their eyes, ears, noses, or fingers. The players are divided into two parties, and stand in adjoining rooms, in the doorway, between the posts of which is stretched a sheet of cloth or paper with a hole in the middle. Each of one party now puts a finger through the hole, and each of the other party guesses who its owner is. As the guesses are made, they are recorded, and when all have guessed, he who has made the most correct guesses is declared the winner. The parties then change places. Instead of fingers, noses, ears, or hands may be put through the hole, or each may apply one eye to it. There may be only one guesser, and as soon as he makes a correct guess the person guessed may take his place.

In another game those whose names are to be guessed kneel down

in a row, and their heads and faces are covered with long paper funnels, each having two holes for the eyes. To the bottoms of the funnels is

pinned a sheet, which hangs to the ground, concealing their bodies. Each one of the guessers now takes a lighted candle, and looking at the

Identification.

eyes through the holes in the paper funnels, guesses who each one is. When all have guessed, the paper funnels are removed. Another method of identification is by the voice. French BLIND MAN'S BUFF is a game of this kind.

ILLUSTRATED BALLADS, ballads illustrated by PANTOMIME or TABLEAUX. The ballad is read or sung by a concealed person. If it be illustrated by pantomime, the action should accompany the ballad from beginning to end; but if by tableaux, they may be shown at intervals, when required. Any ballad telling a simple story may be thus illustrated. Instead of a ballad, a narrative poem may be taken, such as Longfellow's "Evangeline," or "Miles Standish."

I LOVE MY LOVE, a game played by any number of persons, who usually sit in a circle. The one who begins says, for instance, "I love my love with an A, because she is *amiable*; I hate her with an A, because she is *avaricious*. I took her to the sign of the *Antelope*,

and treated her to *apples* and *ale*. Her name is *Anna*, and she lives in *Andover*." The words in italics may be varied as the speaker chooses, but must always begin with A, and if the player is a girl, she must of course speak of her love as a boy. When the first player has finished, the one on his left repeats the sentence, and so on till all have done so, but the words in italics must be entirely new in each case. When a player mentions any one of them a second time, or cannot think of a suitable word, he must pay a forfeit. When all the players have used the letter A, the sentence is repeated again by all in turn, using words that begin with B, and so on through the alphabet, except that X, Y, and Z, and sometimes U, V, and W, are omitted. When a large number play the game, it is often difficult for those whose turns come last to think of words that have not been used, and the turns should therefore be taken alternately in different directions; that is, to the right for A, to the

left for B, and so on. The sentence given above is very commonly used in the game, but it may be varied at the pleasure of the company.

History. The game of I Love my Love was formerly very simple, and consisted in saying "I love my love with an A, because he is agreeable, amiable, attentive," and so on, using all possible adjectives beginning with an A, while the next player took up B in the same way. The game is called in France "Le jeu de l'alphabet" (The Alphabet Game). It is sometimes called "Alphabetical Compliments." The game can be varied in many ways. For instance, each player may represent a merchant, the first saying "My name is Atreus, I come from Attica, I deal in Antiquities, and am going to Ætna;" the second, "My name is Byron, I come from Barbary, I deal in Bananas, and am going to Boston;" and so on through the alphabet. Games of this kind are called in Germany *Spielen mit gegebenen Anfangsbuchstaben* (Games with Given Initials).

INDIAN CLUBS. See GYMNAS-TICS.

INITIALS, a game played by any number of persons. The leader begins by addressing to any player a remark whose words begin with the initials of that player's name in their proper order, or some epithet beginning with those initials. The others, one by one, address the same player in like manner. Whenever the player so addressed can answer one of the others with a sentence or epithet beginning with the latter's initials, before the next player can speak, the players must all address the one so answered, and so the game goes on. For instance, if the player's initials are A. E. B., he may be addressed with "An exquisite beau!" "Are eggs breakable?" "Apples excite boils." "An early bird," etc.

A similar game is known in Germany as *Namenspiel* (The Name

Game). In it the names or epithets are given one by one by each player to his neighbor, who must guess to whom they refer. They may apply to some one in the company or to some well-known person or historical character.

INK, Experiment with. Dissolve one half teaspoonful of salt in a tumblerful of water. Dip a pen in ink, filling it not too full, and touch with it the surface of the water. The ink will descend into the tumbler in curiously shaped drops.

INTELLECTUAL SALAD, a guessing game played by any number of persons. Any number of cards are first prepared, on each of which is written a quotation, with its author's name. The cards are decorated with green leaves of tissue paper, and placed in a salad bowl. One of the company takes them out one by one and reads the quotations, while the others guess the authors' names. The first one who guesses correctly, in each case, is given the card to keep as a memento.

IODIDE OF MERCURY, Experiment with. Mix together solutions of iodide of potassium and corrosive sublimate (the latter should be used with care, as it is very poisonous). A bright scarlet powder will be formed, which may be separated by filtering (see CHEMICAL EXPERIMENTS). This powder is iodide of mercury. When rubbed on paper it leaves a beautiful scarlet stain, but on heating the paper over an alcohol lamp, the stain turns yellow. If the stain be rubbed over with the fingers it will turn scarlet again. The change takes place gradually if the yellow stain be scratched with a pin. The reason is that iodide of mercury crystallizes in two forms, one of which is red and the other yellow. The red form is changed to the yellow by heat, and the yellow crystals are broken up into red ones again by rubbing.

IODINE, Experiments with. The iodine used in these experiments

is a bluish black solid. The liquid iodine used in medicine is really iodine dissolved in alcohol.

1. Take a piece of iodine and heat it in a bottle. It will not melt, but give off a beautiful purple vapor.

2. Powder some iodine fine, and put a very little of it (about as much as will lie on quarter of an inch of the small blade of a knife) into a small saucer. Pour in enough strong ammonia water to cover it, and let it stand for about 20 minutes. Then either stir the powder up, and filter it (see CHEMICAL EXPERIMENTS) or pour off most of the ammonia, and then pour the powder on a piece of blotting-paper. Place the filter-paper or blotting-paper where it will dry in the sun. When it is perfectly dry, rub a stick on the powder, or even brush a feather over it, and it will explode with a crackling noise. Though it has not changed in looks, the iodine has been made by the ammonia into a very explosive substance called Nitrogen Iodide. The reason why so little iodine was used, is that otherwise the explosion might be dangerous.

IRON BURNED IN A CANDLE.

Take any piece of iron, as a bit of wire, or a nail, and scrape it with a knife above the flame of a candle. Very small bits of the iron are scraped off which, although they cannot be seen with the naked eye, take fire as they fall into the flame, and burn with beautiful sparks.

I SPY, an out-door hiding game played by any number of persons. One of the players, who is usually chosen by COUNTING OUT, remains near the goal (which may be a tree, stone, or other object) and, shutting his eyes, counts a number previously agreed upon, generally one hundred. Meanwhile, the others hide, each where he pleases, and when the player at the goal has finished counting, he goes out in search of them. When he sees one he names him, saying, "I spy James Smith,"

or whoever it may be. Both now run for the goal. If the hider touch it first, without being touched himself, he is safe. If the seeker can not catch any of the players he spies, nor touch the goal before them after he spies them, he must close his eyes again while they all hide as before; but if he has caught or touched the goal before one or more players, the first one of them must take the seeker's place in the second game. The hiding players need not wait to be spied, but may run in and touch the goal whenever they think they can do so safely.

This game is sometimes played in England by dividing into two parties, one of which hides and the other seeks. If the seeking party spy two of the hidiers before two others reach goal, they hide in the next game, otherwise the same party hide again.

Hide and Whoop or **Hide and Seek**, a kind of I Spy played by little children. Those who hide call out "Whoop!" when they are ready, and the seeker then looks for them. In the simplest form of the game there is no goal, and the one that is found first becomes seeker in the next game. Another game sometimes called Hide and Seek, is called in this book **HIDE THE HANDKERCHIEF**.

The Greeks played a game of Hide and Seek called *Apodidraskinda* (The Shunning Game), where one sat down and closed his eyes, while the others hid. He who was found first took the seeker's place.

IMPERIAL. See PIQUET.

I SUSPECT, a game of cards played by any number of persons with one or more full packs. The cards are dealt one by one, so as to be as evenly distributed as possible. The eldest hand leads a card, face downward, calling out at the same time the name of a card, which may be the one he laid down or some other. The next player to the left now plays in like manner.

and must call the name of the card next higher than the one named by the eldest hand. The others in turn do the same. Thus if A leads, calling "Six," the others in turn, as they play, say "Seven," "Eight," "Nine," "Ten," "Knave," etc.

When King is reached the next player begins at "One" again. This goes on till some one suspects that the card played is not the same as the card called, when he must say "I suspect." The suspected person then shows the card he played. If the suspicion is correct, the offender must take into his hand all the cards on the table; if it was unfounded, the accuser receives the cards. He who first gets rid of all his cards is the winner.

A just accusation may always be avoided by playing the proper cards in order, but this is impossible with a small hand, hence it is always safe to suspect the holder of a few cards. The last card should always be suspected, since there is only one chance in thirteen of its being right. If a player can get all four cards of the same name into his hand, he is

of course, certain to suspect rightly any one whose turn it is to play one of those cards. A skilful player rarely plays the right card unless he thinks some one is watching him, and saves as many kinds of cards as he can, getting rid of duplicates. When his hand is small, he tries to hide the fact by diverting the attention of the company to some one else.

RULES OF THE GAME.

1. No player can be suspected after the next in order has played his card.

2. A player may conceal his hand as he pleases, to hide the fact that it is small, but he must always show it on demand of any one of the company.

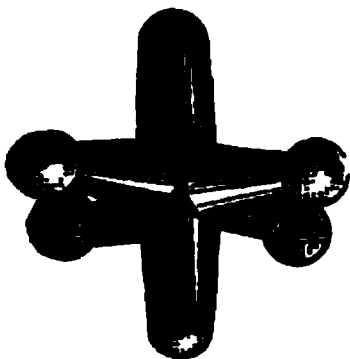
3. The game may be continued after one player's cards are gone, till all the cards are in one hand. In this case any one out of the game may suspect, and if he suspect wrongly he must enter the game again.

This game is called also "I Doubt it," and "You Lie."

J

JACK'S ALIVE. See **ROBIN'S ALIVE.**

JACK-STONES, a game played



Jack-stone.

by one or more persons with five small pebbles, or little pieces of iron shaped as in the illustration. These are thrown up and caught in various ways, and if more than one plays, he wins who first succeeds in going through in order with a certain number of exercises. These exercises differ in kind and number in different places; but some of them are given below.

1. The five Jack-stones are thrown into the air and caught all together on the back of the hand.

2. One of the Stones is tossed up and caught in the hand and on its back alternately. At the successive catches the player calls out "Five!" "Ten!" "Fifteen!" "Twenty!" and so on by fives up to One Hundred.

3. *Ones.* The Jack-stones are held in the hand, and one, called the "Jack," is thrown into the air, while the four others are laid on the floor or table in time to catch the Jack as he comes down. These are then picked up, one by one, each one while the Jack is thrown into the air. When all have been taken into the hand they must be laid down

as before, ready for *Two's*. Only one hand must be used.

4. *Twos, Threes, and Fours*. The same as ones, except that the Stones are picked up first two at a time; then three and one at a time; and then all four at a time.

5. The Stones are all taken in the hand and laid down, first one at a time, then two at a time, and so on, always while the Jack is in the air. Each time after all are laid down, they are picked up all at once.

6. *Riding the Elephant*. The four Stones are placed in a line, and with the Jack on the back of his hand the player traces a curved line in and out among them with his forefinger. At the end he tosses up the Jack, and picks up all the Stones before catching it, all with one hand.

7. *Set the Table*. Four Stones are placed in a heap, and one by one are set at the corners of a square, while the Jack is in the air.

there are very many, require the player to do something with the Jack-stones while the Jack is thrown into the air, and they all require

"Horses in the Stable."

practice. Some of them can be mastered only after hours or even days of hard work. A game of Jack-stones between two or more persons is thus only a trial to see which is most perfect in the exercises.

History. Jack-stones is mentioned by the Greek poet, Aristophanes, as a girl's game more than two thousand years ago, and it has been a common amusement from that time to this. The illustration shows a Greek girl playing. The ancients

"Peas in the Pod."

8. *Peas in the Pod*. The left hand is laid on the table with the ends of the thumb and forefinger joined. Into the circle thus formed the Stones are pushed, one by one, while the Jack is in the air. The hand is then removed and all are picked up together.

9. *Horses in the Stable*. Similar to the above, save that the fingers of the hand are outstretched and one Stone pushed into each opening.

All these exercises, of which

Greek Girl Playing Jack-stones.
played it with the knuckle-bones of sheep, and it is still so played in Europe, but in this country pebbles

or iron Jack-stones are commonly used. In England it is called "Dibs." "Cockall" was an old name for it, and the French call it *Osselets* (little bones). Sometimes, also, it is played with marbles, and the jack is often of a different size or color from the rest. The name "Jack-stones" is probably a corruption for "Chuck Stones." In Scotland small pebbles are called "*chuckie-stanes*." In Germany it is called *Handtopsen* or *Knöchelchen*, and the Jack receives in various parts of that country different names, such as *Hecker*, *Dopser*, and *Hopper*.

Oti-dama, or **Japanese Jack-stones**, the game of Jack-stones played with little bags about an inch and a half square, partially filled with rice. Some of the figures of Oti-dama differ from those of ordinary Jack-stones. Seven bags are often used, and the Jack is sometimes made of a different shape. The name is in Japanese *O-tédama*, from *O te tama* (The Hand-balls). The game is common in Japan, and pebbles also are used in playing it there, as with us.

JACK-STRAWS, a game played by any number of persons with little sticks of ivory or wood of equal length, generally between four and six inches. Some of these sticks, called Jack-straws, and usually twenty to one hundred in number, are plain, and some carved to look like various objects, as weapons, tools, garden implements, and the like. The players sit around a table, and the one who begins takes up the Jack-straws in one hand, in a bundle, and then holding them upright and touching the table, suddenly lets go, so that they fall outward in all directions. Each in turn then tries to pull from the pile with a little hook, made for the purpose, as many of the straws as he can, one at a time, without shaking any of the others. If he shakes any Jack-straw ever so little, he must stop, and the turn passes to the

next. When the pile is gone, he who has the most Straws wins. Sometimes the Straws are marked with different numbers, and then at the close of the game each adds his numbers, and he who has the highest wins. The game is sometimes called Jerk-straws, and perhaps the common title is a corruption of this. The English often call it Spillikins, and the Germans *Feder Spiel* (the Pen Game). The French call Jack-straws *Jonchets*, or *Honchets* (from *Joncher*, to strew), and name particular pieces the King, the Queen, and the Knight. These are of different shapes from the others, and being more difficult to extract from the pile, count more than the common straws, the King being valued at 20 points, the Queen at 10, and the Knight at 5.

JACOBY, a game of cards played by three persons with a full pack. Four hands are dealt, as in WHIST, with a Dummy. The cards in Dummy's hand are sorted in sequences, the highest first, beginning with Clubs, followed in order by Hearts, Spades, and Diamonds. The cards are played as in WHIST, except that each player is for himself. Dummy follows suit when he can, always playing his highest card, and when he cannot follow suit he plays the first card in his hand, arranged in the order described. He is never allowed to take a trick, and therefore never leads. If he play a card that would ordinarily take the trick, it goes to the next highest card played. The object is to get rid of the Jacks. Each trick counts one, but for each Jack taken a number must be deducted from the score. Thus, for the Jack of Clubs, 4 is deducted; for the Jack of Hearts, 3; for the Jack of Spades, 2; and for the Jack of Diamonds, 1. He who first makes ten points wins the game.

JUSTICE IS BLIND, a game played by any number of persons, one of whom, representing Justice, is blind-

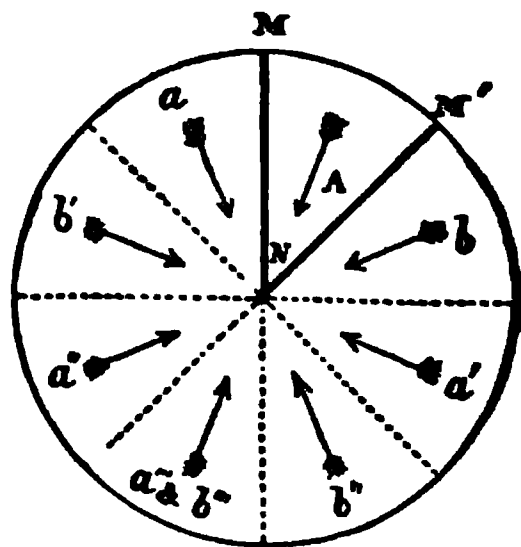
folded. Justice is given a seat in the middle of the room, and then a second player leads up the players, one by one, and asks Justice's opin-

ion of each. Whenever the opinion is correct, as decided by a majority of the company, Justice changes places with the person judged.

K

KALEIDOSCOPE. The ordinary toy kaleidoscope is described in C. C. T. A large one, to furnish amusement at an evening party, may be made thus: The lid of a piano is opened and rested on piles of books, so that it forms an angle of 60 degrees with the top, and the whole is then covered with the piano-cloth, or with a large table cover. The polished top and lid of the piano take the place of the glass mirrors in the small kaleidoscope, and when objects are held or moved at one end they will appear in beautiful and complicated designs to any one looking in at the other. The cover should hang down over the end at which the observer stands, so that he may put his head under it. The objects at the other end, which may be anything bright or colored, must be shaken about and changed rapidly. Thus the exhibitor may first twirl a bouquet of artificial flowers in front of the kaleidoscope, then shake his fingers there, then dangle two or three silver spoons at the end of a string, then look in and make a face, and so on. The objects should be brightly lighted, but the lamp or gas fixture should be placed so that it does not show in the kaleidoscope. The reason why the reflections appear in a regular design in a kaleidoscope will be understood by looking at the figure, which, if looked at from the left, may represent a section of the piano-lid and top, M and M'. The top M will be reflected in the lid M', appearing as the dotted line just beyond, and this reflection behaves like a real mirror, so the lid is reflected in it,

appearing as the next dotted line. In the same way the reflections shown by the other dotted lines appear. Therefore the observer sees eight polished surfaces radiating from the middle point, and if any object A is held between the lid and top, it will appear also between every pair of these reflected



Principle of Kaleidoscope.

surfaces. Thus eight objects, *a*, *b*, *a'*, *b'*, etc., are seen arranged in a regular design, of which only one is real, the others being reflections. The centre of the design is always the angle between the piano top and lid. By varying this angle, the number of reflections, and therefore the shape of the design, will be changed, there being more images as the top and lid are brought nearer together. A kaleidoscope for use with the MAGIC LANTERN can be made by placing two mirrors against the screen, at an angle, and throwing between them the image of a slide made of two pieces of glass having heads or fragments of glass between them. The image can be varied, as in the ordinary kaleidoscope, by shaking the slide.

The audience must sit on the opposite side of the screen from the lantern.

Diffraction Kaleidoscope, a toy depending on the principles explained under **DIFFRACTION GRATINGS**. It has one of these gratings, ruled with a diamond-point on glass, for an eye-piece, and for objects disks of pasteboard with needle holes in various patterns. These can be arranged to suit the fancy of the observer. The light passing through these holes, when viewed through the grating, produces various beautiful colored patterns.

Tube Kaleidoscope. Paint a glass tube (for instance the straight part of an Argand lamp chimney) black on the outside. Look through this at a pin-hole in a piece of paper, and several circles of light will be seen, one within another. Any design or figure looked at will in like manner be reflected in circles, making a curious effect. The tube may be closed at one end by two pieces of glass, between which are placed beads or other small colored objects, as in an ordinary kaleidoscope.

KENO. See **LOTO**.

KEY OF THE KING'S GARDEN. See **REPEATING GAMES**.

KING AND QUEEN, a game or trick in which any number of persons may take part. All who have never played the game before are sent out of the room. A boy and girl are then selected as King and Queen and seated on a throne made of two chairs, placed about two feet apart and covered with a shawl or rug. The covering is stretched while the King and Queen take their seats, and their weight keeps it smooth, so that the throne looks like a solid bench, covered with a shawl. The other players are then asked to come in one by one. As each appears, one who is chosen for the purpose introduces him to the King and Queen and says that they wish him to sit between them. Just

as he is about to take his seat the King and Queen rise and allow him to fall between the chairs. He then takes his place among the other spectators, and witnesses the reception of his companions. The King and Queen must rise exactly at the right moment. If they do so too soon, the victim will have time to save himself; if they wait until he has rested his weight on the shawl, he will discover the trick and get up quickly.

KING ARTHUR WAS KING WILLIAM'S SON, a singing game played by boys and girls. A row of hats is placed on the floor, and the leader of the game, putting the first one on his head, marches about and sings to the tune of "Maryland, My Maryland":

"King Arthur was King William's son,
And when the battle he had won,
Upon his breast he wore a star,
And it was called the sign of war."

He then picks up the next hat and puts it on the head of any one he chooses, who must then follow him while they sing the same verse. This goes on till all the company are in line. Sometimes the first line is "King William was King James's (or King George's) son." A kissing game is played by adding to this stanza, or a similar one, the lines,

"Star of the East, Star of the West,
Star of the one you love the best,
Down on the carpet you must kneel,
As the grass grows on the field,
Salute your bride and kiss her sweet,
And rise again upon your feet."

This game is played in this and other ways in Ireland, and is common in the Middle and Southern United States.

KING CÆSAR. See **PEELAWAY**.

KING'S CASTLE, a game in which several players try to dislodge one from some position he has chosen. It is called in France *Le Roi Dethroné* (The Dethroned King). The King selects for his castle a hillock or mound, and the other players try to dethrone him by pushing or pulling him down. Sometimes

only pushing is allowed. During the civil war in England between the Parliament and Charles I., the Puritans besieged Hume Castle, and the commander, when ordered to surrender, replied,

"I, William of the Wastle,
Am now in my castle,
And a' the dogs in the town
Winna gae me gang down."

This rhyme is supposed to have been quoted from a boy's game of the time, probably the same as that just described. In Pennsylvania the defender of the castle says:

"Hally, hally, haste,
Come into my new castle."

In a variation of the game all the players act as defenders except one, who tries to gain entrance, saying:

"Hally, hally, haste,
Get off my new castle."

KING'S LAND. See TAG.

KITE-FLYING. The article KITE in C. C. T. describes several forms of

points in which skill is especially shown in making a kite are the arrangement of the string and the tail. Two or more short strings are fastened to the kite frame and these are joined in a knot, to which the kite string is afterward tied. The kite (without its tail), if lifted by this knot, should hang with its sides perfectly even and the point where the tail is to be attached a little lower than the top. If, in flying, the kite plunges sidewise, it is probably because this knot is too high; if it whirls around, the knot is too low.

The tail should never be less than twelve times, and may be even twenty times, the length of the kite. It may be made of string with stuff "bobs" of folded paper three inches long placed at intervals of three inches, or it may be of strips of cloth tied together, in which case it should be somewhat shorter. To fly a kite, one person must hold it in the air as high as he can, while the other stands about fifty feet distant in the direction from which the wind is blowing, with the string in his hand. At a signal from the latter, the former releases the kite, while the latter runs towards the wind till the kite has mounted a little way. He then lets out string till the kite is as high as he wants it to go. The running is for the purpose of increasing the force of the air striking the kite, as near the ground the wind is apt to be light. In a strong wind it is often unnecessary to run at all. When a kite has reached such a height that the weight of string attached to it is all it can carry, it will go no higher by itself, but the end of the string may be attached to a second kite which may be sent up in the usual manner. One kite after another may thus be sent up till their combined pull is all that the flyer can hold. Two kites sent up in this way can be made to pull a carriage, the main kite being pre-

Japanese Kite.

Kites, and tells some interesting things about them. A Japanese form is shown in the illustration, easily made from the thin slips of bamboo in a Japanese fan, and covered with tissue-paper. The

ceded about 100 feet by a smaller one, called a pilot kite, which can be turned to one side or the other by strings, and the carriage can thus be guided somewhat. Benjamin Franklin once allowed himself to be drawn across a river by a kite, when he was bathing.

While the kite is in the air, if little pieces of paper with holes in the middle be strung on the string, the force of the wind will carry them up to the kite. These are called "messengers." Messengers made like a toy paper windmill will twirl around as they rise.

Kite-fighting, a contest between two kite-flyers to see which can capture or disable the other's kite. With ordinary kites this is done by entangling the tail of one in the string of the other. The kite whose tail is thus entangled is said to be captured. To capture a

hostile kite, the flyer must make his own kite pass under the string of the other and then let out twine; when his kite has fallen behind that of the enemy he pulls it in rapidly. Kites with broken glass or knife blades fastened to the

tail are sometimes used in these contests, the object in this case being to cut the opponent's string by sweeping the tail across it. They should be six-sided. The pieces of glass for the tail are obtained by chipping them from a thick glass bottle. Pieces with one edge sharp and the other thick and blunt are selected, and three are fastened to the string



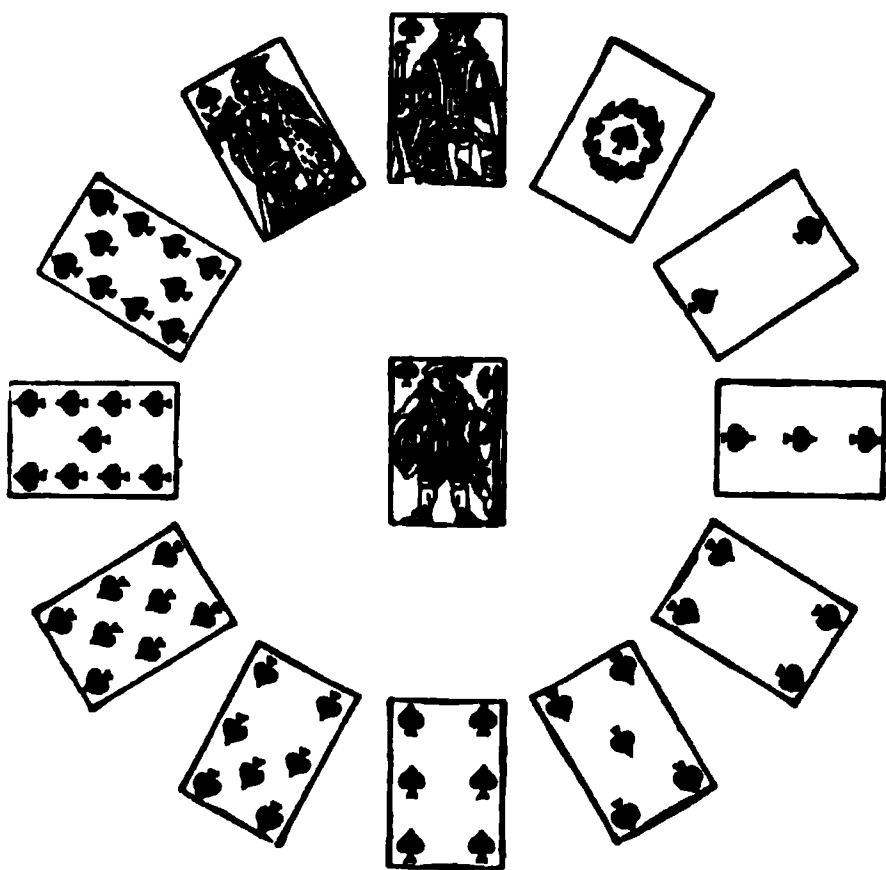
Kite-cutter.

at one point with wax, so that they

all point outward. Strips of wood are now bound to the string lengthwise between the knives to keep them in place. Kite-fighting originated in China, where it is a favorite sport.

History. Kites appear to have been brought into Europe from China or Japan, where they were first used. The English name is from a supposed resemblance to the bird called a Kite. The French call the kite *cerf volant* (flying stag), the Scotch name it Dragon, and the Germans call it *Drache* which means the same thing.

KNAVE'S DIAL, a SOLITAIRE game of CARDS, played with one or two full packs. All cards of the suit of the first one played are placed, as they appear, in a circle to represent the numbers on a clock dial, the Queen counting as 11 and the King as



Knave's Dial.

12. The Knave is placed in the centre. On this dial is placed another of a differently colored suit, and so on till all the cards are used. Cards that cannot at once be put in place are laid aside to form stock, and the stock can be shuffled and relaid twice. If the four dials can thus

be formed, one above another, the player wins.

KNIGHT OF THE WHISTLE, a trick, which the victim supposes to be a game. The person who is to be duped is told that the game consists in passing a whistle around a circle of players, while one, standing in the middle, is required to find it by its sound, as it is blown from time to time. Whoever "counts out" for the game must arrange that the player in the middle is some one who does not know the trick, which will now be explained: The whistle is fastened to one end of a string about two feet long, at the other end of which is a bent pin. The pin is hooked into the clothes of the player in the middle of the ring, so that the whistle always hangs behind him. It is blown by some one, and the seeker turns quickly to find it, thus carrying it in front of some one else, who blows it again. The victim of the trick is thus kept turning from side to side till he discovers the deception. The pin can be hooked into his clothes without his noticing it by making him kneel down and close his eyes, and then, after going through a mock ceremony, declaring him a "Knight of the Whistle," and striking him on the back. While this is going on, the whistle can be attached to him unobserved. The players should pretend to pass the whistle from one to the other so as to increase the deception.

KNIGHTS OF SPAIN, a game played by three boys, representing Spanish knights, and any number of girls, representing a mother and her daughters. The mother and daughters sit in a row, and the knights advance to ask the hand of one of the latter in marriage. A dialogue is carried on in verse, of which there are many varieties. The following is one common form:

KNIGHTS.

"Here come three lords out of Spain,
A courting of your daughter Jane."

MOTHER.

"My daughter Jane is yet too young
To be ruled by your flattering tongue."

KNIGHTS.

"Be she young or be she old,
'Tis for the price she may be sold."

"So fare you well, my lady gay,
We must turn another way."

MOTHER.

"Turn back, turn back, you Spanish Knight,
And scour your boots and spurs so bright."

ONE OF THE KNIGHTS.

"My boots and spurs they cost you nought,
For in this land they were not bought."

MOTHER.

"Turn back, turn back, you Spanish Knight,
And choose the fairest in your sight."

ONE OF THE KNIGHTS.

"I'll not take one nor two nor three,
But pray Miss (Mary) walk with me."

The knight then takes the hand of the girl named and walks around the room with her. On his return he says:

"Here comes your daughter safe and sound,
In her pocket a thousand pound."

"On her finger a gay gold ring,—
I bring your daughter home again."

Sometimes the girl runs away and is pursued by her mother or the knight.

History. This game is played in many different forms throughout Europe. The English and Scotch versions are similar to ours, but in Spain the "knights" represent an embassy from the Moorish king. The verse probably dates from the middle ages. In the last century the game was very popular in the United States, and it is still played somewhat. Another version of the game begins "Here comes a duke a-roving," sometimes corrupted into "We are three ducks a-roving."

KNITTING-NEEDLE, Experiment with a. Heat a knitting-needle to redness in an alcohol flame, holding it by a cork on one end so that the fingers may not be burned. Dip the red hot needle into cold water, and then hold it again in the flame. It will change

color curiously, turning first yellow, then orange, crimson, violet, blue, and finally gray. The reason is, that a film of rust forms on the needle, which alters its color as it grows thicker. In tempering steel (see KNIFE in C. C. T) these colors are carefully watched, for the kind of steel depends on the time when it is taken from the fire and cooled. If the knitting-needle be cooled

when it is yellow, for instance, it will be much harder than if cooled when it is blue.

KNURR AND SPELL, corrupted into "Northern Spell," a game of ball played by any number of persons, with trap, bat, and ball. The trap is like that used in TRAP BALL. The bat, represented in the illustration, is of wood with a handle of cane, four or five feet long.

Knurr and Spell.

The ball is of wood or white porcelain, about an inch and a half in diameter. The players take turns at the bat, and, sending the ball into the air from the trap, as in Trap Ball, try to knock it with the bat as far away as possible. The distance of the spot where the ball strikes from the trap is measured in yards, and after each player has had a certain number of turns, the distances made by each are added together. He whose sum is largest

is the winner. In striking the ball, the bat is held in both hands by the end of the handle, and whirled around the player's head. The distance to which the ball can be driven depends less on force than on skill, which can be gained only by practice.

This game is played chiefly in the north of England. The bat used is called the Knurr (a knot or knob), and the trap the Spell.

L

LACROSSE, an out-door game played by 24 persons, 12 on a side, each of whom has a stick, or crosse, like that shown in the illustrations, and fully described in Rule I. below. At each end of the playing-field, which is as near 125 yards long as possible, is a goal consisting of two posts, six feet high and the same distance apart. Each side faces one of these and tries to carry or throw toward it with the crosse a solid rubber ball, somewhat smaller than a base-ball. The side that succeeds in propelling the ball through their opponents' goal, either by throwing or striking it with the crosse, or by kicking it, scores a goal, and the side that gains the greatest number of goals in the allotted time (see Rule IX., Sec. 8), wins the game.

The titles of the players and their positions at the beginning of the game are given below, those defending the lower goal being in italics.

(Goal)

Goal-keeper

Point	<i>Inside Home</i>
Cover Point	<i>Outside Home</i>
First Defence	<i>First Attack</i>
Second Defence	<i>Second Attack</i>
Third Defence	<i>Third Attack</i>
Centre Field	<i>Centre Field</i>
Third Attack	<i>Third Defence</i>
Second Attack	<i>Second Defence</i>
First Attack	<i>First Defence</i>
Outside Home	<i>Cover Point</i>
Inside Home	<i>Point</i>

Goal-keeper
(Goal)

The players generally remain near these positions throughout the game. In the Defence half of the field, the players, as a rule, try to throw the ball as nearly as they can the full length of the field, and at the same time land it at about Cover Point at the other end; while the

Attack half usually run toward their opponents' goal until "checked," or stopped, when they "pass" the ball to another of their team, who, in

Facing.

turn, does the same, each player returning to his original position upon surrendering the ball. Thus, if the Attack are well trained and play well together, one of them will eventually have a good opportunity to "shoot for goal." At the opening of the game, the ball is "faced" in the centre of the field; that is, placed on the ground there between the crossed sticks of the two opposing players whose positions are each Centre (see list of positions), and who must each have one knee on the ground. When "Play" is called, each Centre has one of three methods of play to adopt: either he can use some trick to obtain the ball himself (and this is the most frequently used), or else he can draw his stick rapidly away, trying to force the ball behind him, where one of his team is always ready to receive it, should the Centre be successful. In the third and last method, which the Princeton College Lacrosse Team invented, he may, by jumping up on his feet and keeping his body between the ball and his opponent, give a player on his side a chance to run up and obtain the ball. The ball must not be

touched with the hand, however, at any time, by any player, except the Goal-keeper. He who succeeds in getting it after the "face" may strike it with his crosse, run with it in his crosse, or throw it by means of his crosse. The opposing team try to get the ball from him, either by striking his crosse with their crosses, or by "body-checking" him, that is to say, running into him bodily. Care must be taken, however, not to run against an opponent's back, and not to use one's hands, arms, or legs in "body-checking."

A line drawn six feet in front of each goal is called the "Goal-crease," and no attacking player is allowed inside it until the ball has passed Cover Point. The Goal-keeper, while defending the goal, stands inside the "Goal-crease," and is allowed privileges that are denied to the other players. (See Rule XII.)

Picking up and Carrying. A player, when running, always picks up the ball by pushing his crosse under it; when standing, however, he hooks the ball towards him with his crosse and then pushes it under, the ball rolling on by its own impetus. In pushing the crosse, the player leans down so that it will not make too great an angle with the ground. When the ball is already running toward the player he has merely to let it roll up on his crosse, but the crosse must be held at a greater angle the faster the ball is coming. If the ball is rolling very fast and the crosse is held so as to offer too gentle an incline, the ball is likely to bound up into the player's face. If the ball comes on a swift bound, the player should be able, by not standing directly in front of it, to catch it in his net without any difficulty, the old idea of "blocking" or knocking it straight downward and catching it when it rises, being entirely given up, nowadays, as in doing that too much valuable time is lost. When it

comes on the fly it is received on the net, the crosse being drawn back slightly as the ball strikes it.

A "liner" is caught by a player's moving to one side, holding his crosse in a horizontal position, and allowing it to "give" a little when the ball strikes it. All these movements (and many more could easily be described) require a great deal of practice to render them successful.

Running and Dodging. As a rule, each team has its own method of play, but good critics consider it poor play to keep the men running until "checked;" it being far better to save their strength by teaching the Defence to throw as far and as accurately as possible, and the Attack to "pass" among themselves as quickly and accurately as possible. In running, the ball is held on the crosse, which is inclined slightly downward in front of the player, the inclination increasing with the speed. The ball is kept in place partly by the resistance of the air, and rests against the stick of the crosse, which is turned slightly to one side for the purpose. When the runner meets an opponent, he must take care to prevent the latter from striking his crosse, and at the same time prevent "body-checking." Sometimes he changes the crosse from one hand to another, or even turns his back, which makes it difficult for the enemy to get at his crosse. Sometimes, with a quick wrist-movement, he throws the ball over his opponent's head, or to one side, running on and catching it again before his antagonist has time to turn. On the other hand, the player who is trying to get the ball strives to knock it out of the runner's stick, or else, which is far more customary nowadays, he tries to upset him by "body-checking." One method of knocking a ball out of a runner's stick is to strike the crosse down, not hitting the ball, which may then be caught in the air.

Throwing. This is the term applied nowadays strictly to the Defence who "throw" the full length of the field. The act of sending the ball from one Attack man to another is now termed either "tipping," or "passing," and that of attempting to send the ball between the posts a "shoot for goal." When an Attack player with the ball finds that he can run no farther and that dodging is useless, he passes the ball to another player on his own side, either one who is farther forward, or who has a clear field before him. There are many kinds of throws, of which only a few will be described here. Of Defence throws, the best is to turn the back in the direction in which the ball is to be thrown and raise the crosse straight up, so as to throw over the head. Skilful



Throwing backward.

players throw thus with great accuracy of aim, and the plan has the advantage that, as the thrower's back is toward the checking player, it is hard for the latter to interfere.

The crosse must be turned sideways a little to prevent the ball's falling off, as the player turns, and the throw is made chiefly from the

elbow, the crosse being stopped suddenly just before the hands touch the face.

Perhaps the most universal, and certainly the best Attack throw is made by bringing the crosse around to the right side, then raising it, and throwing from the shoulder.

Tipping may be done in two ways: either by a single player's tossing the ball a foot or so and catching it again, repeating this performance as he runs, or else by two players running along together, and as each is compelled by opponents "checking" them to do so, tossing or passing the ball a few feet from one to the other. (See Rule XII.) Other details of the game are given in the following playing rules of the New England Amateur Lacrosse Association. Those of the rules relating to the discipline of the association and having nothing to do with the game, are omitted.

RULE I.—The Crosse. SEC. 1. The crosse may be of any length to suit the player; woven with cat-gut, which must not be bagged. ("Cat-gut" is intended to mean raw-hide, gut, or clock-strings; not cord or soft leather.) The netting must be flat when the ball is not on

Goal Tend.

it. In its widest part the crosse shall not exceed one foot. A string

must be brought through a hole at the side of the tip of the turn (to prevent the point of the stick catching an opponent's crosse). A leading string resting upon the top of the stick may be used, but must not be fastened, so as to form a pocket, lower down the stick than the end of the length strings. The length strings must be woven to within two inches of their termination, so that the ball cannot catch in the meshes.

SEC. 2. Players may change their crosse during a match.

RULE II.—*The Ball*. SEC. 1. The ball must be of sponge rubber, manufactured by the New York Rubber Co. In each match a new ball must be used, furnished by the home team. It shall become the property of the winning team.

SEC. 2. The ball shall be of the size of the ball marked No. 40, regulation by the New York Rubber Co.

RULE III.—*The Goals*. SEC. 1. The goals must be at least 125 yards from each other, and in any position agreeable to the captains of both sides. The top of the flag-poles must be six feet above the ground, including any top ornament, and six feet apart. In matches they must be furnished by the challenged party.

RULE IV.—*The Goal Crease*. SEC. 1. No attacking player must be within six feet of either of the flag poles, unless the ball has passed Cover-point's position on the field.

RULE V.—*Referee*. SEC. 1. The Referee shall be selected by the captains.

SEC. 2. Before the match begins, the referee shall see that properly qualified Umpires are selected, as provided for in Rule VI. All disputed points and matters of appeal that may arise during his continuance in office shall be left to his decision, which, in all cases, must be final, without appeal.

SEC. 3. Before the match begins, he shall draw the players up in lines,

and see that the regulations respecting the ball, crosses, spiked soles, etc., are complied with. He shall also see that the regulations respecting the goals are adhered to. He shall know before the commencement of a match the number of games to be played, the time for stopping, and any other arrangements that may have been made by the captains. He shall have the power to suspend, at any time during the match, any player infringing these laws—the game to go on during suspension.

SEC. 4. When "foul" has been called by either captain, the referee shall immediately cry "time," after which the ball must not be touched by either party, nor must the players move from the positions in which they happen to be at the moment, until the referee has called "play." If a player should be in possession of the ball when "time" is called, he must drop it on the ground. If the ball enters goal after "time" has been called, it shall not count.

SEC. 5. The jurisdiction of the referee shall not extend beyond the match for which he is appointed; and he shall not decide in any matter involving the continuance of a match beyond the day on which it is played. The referee must be on the ground at the commencement of and during the match. At the commencement of each game, and after "fouls" and "balls out of bounds," he shall see that the ball is properly faced, and, when both sides are ready, shall call "play." He shall not express an opinion until he has taken the evidence on both sides. After taking the evidence, his decision in all cases must be final. Any side rejecting his decision, by refusing to continue the match, shall be declared losers.

SEC. 6. When game is claimed and disallowed, the referee shall order the ball to be faced for, from where it is picked up; but in no

case must it be closer to the goals than ten yards in any direction.

RULE VI.—Umpires. SEC. 1. There shall be one Umpire at each goal. They shall not be members of either club engaged in a match, nor shall they be changed during its progress without the consent of both captains.

SEC. 2. Their jurisdiction shall last during the match for which they are appointed. They shall not change goals during a match.

SEC. 3. No person shall be allowed to speak to an umpire, or in any way distract his attention, when the ball is near or nearing his goal.

SEC. 4. They shall stand behind the flags when the ball is near or nearing their goal. In the event of game being claimed, the umpire at that goal shall at once decide whether or not the ball has fairly passed through the flags, his decision simply being "game" or "no game," without comment of any kind. He shall not be allowed to express an opinion, and his decision shall in all cases be final, without appeal.

SEC. 5. In the event of the field captains failing to agree upon the umpires, after three nominations (in accordance with this rule) have been made by each party, it shall be the duty of the referee to appoint one or more umpires, as may be required, who shall not be one of the persons objected to, who must be duly qualified, as required by this rule.

SEC. 6. Only the captain of either side and one other player by him appointed shall have the right to call "foul," and the referee shall not stop the game when "foul" is called by any one else. In championship matches they shall be appointed the day previous.

RULE VII.—Captains. Captains to superintend the play shall be appointed by each side previous to the commencement of a match. They shall be members of the club

by whom they are appointed, and no other. They may or may not be players in the match; if not, they shall not carry a crosse, nor shall they be dressed in lacrosse uniform. They shall select umpires and referees, as laid down in these rules, toss for choice of goals, and the captain and one player appointed by him shall be entitled to call "foul" during a match. They shall report any infringement of the laws during a match to the referee.

RULE VIII.—Names of Players. The players on each side shall be designated as follows: "Goal-keeper," who defends the goal; "Point," first man out from goal; "Cover-point," in front of Point; "Centre," who faces; "Home," nearest opponent's goal; others shall be termed "Fielders."

THE GAME.

RULE IX.—Miscellaneous. SEC. 3. The game must be started by the referee facing the ball in the centre of the field between a player on each side. The ball shall be laid upon the ground between the sticks of the players facing, and when both sides are ready the referee shall call "play." The players facing shall have their left side toward the goal they are attacking, and shall not be allowed to use a left-handed crosse.

SEC. 4. A match shall be decided by the winning of most goals in every match, unless otherwise agreed upon. Games must in all cases be won by putting the ball through the goal from the front side.

SEC. 5. Captains shall arrange, previous to a match, whether it is to be played out in one day, postponed at a stated hour in the event of rain, darkness, etc., or to be considered a draw under certain circumstances, and if postponed, if it is to be resumed where left off.

SEC. 6. If postponed and resumed where left off, there shall be no change of players on either side.

SEC. 7. Either side may claim at least five minutes' rest, and not more than ten, between each game.

SEC. 8. The time of game shall be two half hours, with ten minutes rest between.

SEC. 9. No change of players must be made after a match has commenced, except for reasons of accident or injury during the game.

SEC. 10. Should any player be injured during a match, and compelled to leave the field, the opposite side shall drop a man to equalize the teams. In the event of any dispute between the field captains as to the injured player's fitness to continue the game, the matter shall at once be decided by the referee.

RULE X.—*Spiked Soles.* No player must wear spiked soles or boots, and any player attempting to evade this law shall be ruled out of the match.

RULE XI.—*Touching Ball with the Hand.* The ball must not be touched with the hand, save in cases of Rules XII and XIII.

RULE XII.—*Goal-Keeper.* The goal-keeper while defending goal within the goal-crease, may pat away with his hand, or block the ball in any manner with his crosse or body.

RULE XIII.—*Ball in an Inaccessible Place.* Should the ball lodge in any place inaccessible to the crosse, it may be taken out with the hand, and the party picking it up must "face" with his nearest opponent.

RULE XIV.—*Ball out of Bounds.* Balls thrown out of bounds must be "faced" for at the nearest spot within the bounds, and all the players shall remain in their places until the ball is faced. The referee shall see that this is properly done, and when both sides are ready shall call play. The "bounds" must be distinctly settled by the captains before the commencement of the match.

RULE XV.—*Accidental Games.* Should the ball be accidentally put

through a goal by one of the players defending it, it is game for the side attacking that goal. Should it be put through the goal by any one not actually a player, it shall not count.

RULE XVI.—*Ball Catching Netting.* Should the ball catch in the netting, the crosse must be struck on the ground to dislodge it.

RULE XVII.—*Fouls, and Penalties for Same.* The following shall constitute fouls, and be punished as such by the referee:

SEC. 1. No player shall grasp an opponent's crosse with his hands, hold it with his arms or between his legs, nor shall any player more than six feet from the ball hold his opponent's crosse with his crosse, run in front of him, or interfere in any way to keep him from the ball until another player reaches it.

SEC. 2. No player with his crosse or otherwise shall hold, deliberately strike or trip another, nor push with the hand, nor wrestle with the legs so as to throw an opponent.

SEC. 3. No player shall hold the ball in his crosse with his hand or person, or lay or sit on it.

SEC. 4. No player shall charge into another after he has thrown the ball.

SEC. 5. The crosse or square check which consists of one player charging into another with both hands on the crosse, so as to make the crosse strike the body of his opponent, is strictly forbidden.

SEC. 6. No player shall interfere in any way with another, who is in pursuit of an opponent in possession of the ball.

SEC. 7. "Shouldering" is allowed only when the players are within six feet of the ball, and then from the side only. No player must under any circumstances run into or shoulder an opponent from behind.

SEC. 8. The referee shall be the judge of fouls, and shall call time to decide them only at the request

of the captains or the men appointed by them.

SEC. 9. When a foul is allowed by the referee, the player fouled shall have the option of a free "run" or "throw" from the place where the foul occurred. For this purpose all players within ten feet of said player shall move away to that distance, all others retaining their positions. But if a foul is allowed within twenty yards of the goal, the man fouled shall move away that distance from goal before taking the run or throw allowed him.

SEC. 10. If a foul is claimed and time called, and the foul then not allowed, the player accused of fouling shall be granted a free "run" or "throw" under the conditions above mentioned (Sec. 9).

SEC. 11. No player shall throw his crosse at a player or at the ball, under any circumstances: and such action will be considered a "foul." Should a player lose his crosse during a game, he shall consider himself "out of play," and shall not be allowed to touch the ball in any way until he again recovers it. Kicking the ball is absolutely prohibited to players without a crosse.

SEC. 12. Any player considering himself purposely injured during play, must report to his captain, who must report to the referee, who shall warn or suspend the player complained of.

SEC. 13. For deliberate fouls which occasion injury to opponents or affect the result of the game, for the first offence, the referee shall have power to suspend the player committing it for the rest of the game (not match); for a second offence, the referee may remove the offending player and compel his side to finish the match short-handed.

SEC. 14. Any player deliberately striking another, or raising his hand to strike, shall be immediately ruled out of the match.

RULE XVIII.—*Settlement of Disputes.* In the settlement of any dispute, whether by the umpires or referee, it must be distinctly understood that the captains, with one player each to be selected by them, have the right to speak on behalf of their respective clubs; and any proposition or facts that any player may wish brought before the referee must come through the captains or the players selected by them.

RULE XIX.—*Flag-pole Down.* In the event of a flag-pole being knocked down during a match, and the ball put through what would be the goal if the flag-pole were standing, it shall count game for the attacking side.

History. Lacrosse, in one form or another, is said to have been played by the North American Indians from a very early time, to teach their young men strength and endurance. The game is described by early French missionaries to Canada, and the Jesuits named it La Crosse, from the stick with which it was played, which resembled the French *Crosse* or hockey-stick. The original meaning of the word is a bishop's staff, or crozier, shaped something like a hockey-stick. The Chippewa name was *Baggatinaway*. On June 4, 1763, the fort at Michilimackinack (now Mackinaw, Mich.) was surprised and taken from the English by a party of Indians who pretended to be playing a game of Lacrosse. The game is still a favorite with the Canadian Indians, among whom are to be found its finest players. It is widely played by Canadians, and has been called their national game, holding the same place with them that Base-ball does in this country. It has lately been introduced into the United States, where it finds some favor, and numerous clubs have been organized to play it.

LADY OF THE MANOR, a SOLITAIRE game of CARDS, played with two full packs. Four piles of

twelve cards each are placed in a row, one pile at a time. The rest of the cards are now divided into thirteen piles, which are placed in a semicircle above this row. Each of the thirteen piles contains only cards of the same value, and they are arranged in regular order, from Ace to King. The player's object is now to form families, without following suit, by placing the eight Aces in a row below, and building upwards from them. Cards may be taken for this purpose from the top of any of the four original piles, or from these in the semicircle. If the families can be completed, the player wins. The semicircle should be resorted to only in case of necessity.

LAMP - LIGHTER, Experiments with. Lamp-lighters were formerly used instead of matches for lighting lamps, being lighted at a fire. They are made by rolling up strips of newspaper about eighteen inches long and one and a half inches wide, beginning at one corner. The large end is folded over to prevent unwinding. In performing the following experiments keep away from draughts.

1. Light the lower end, hold the lamp-lighter slantingly, and as the flame moves towards the upper end, a tongue of flame still burns at the charred lower end. Blow this out, allowing the other to burn, and its place will be taken by a stream of smoke. This smoke may be lighted like gas.

2. Leave the large end of a lamp-lighter open, and holding it at that end, to prevent unwinding, and light the lower end. There is now no second flame, but the smoke pours from the upper end, and may be lighted as before.

3. Repeat Experiment 2, holding the charred end over the mouth of a jar or wide-mouthed bottle. Pinch the upper end after the smoke has begun to stream out, and it will pour out of the lower end, without burn-

ing, into the bottle, which it will fill. Light the smoke in the bottle and it will take fire with a sudden flash.

4. Fill the bottle with the smoke, but allow it to subside. Repeat six or eight times, and several drops of a yellow liquid will be collected. Heat these in a tin spice-box over a flame, and smoke will again be produced, which may be burned as before.

LAWN BILLIARDS, a lawn game played by from two to ten persons, with balls like CROQUET balls, which they try to drive through a ring. The implements are shown in Fig. 1. The ring, which is of metal, is just large enough to allow a ball to pass through it, and is set loosely in a wooden or metal peg, driven into



Fig. 1.

the ground, as in Fig. 2, so that it can revolve easily. The balls are propelled with a cue, consisting of a wooden handle three or four feet long, with a small ring fixed in the end at an angle. Each player may have one of these, or each may use the same one in succession. The object of each is to drive his ball through the ring, which scores one point. If a ball bounds through from another ball, it counts two

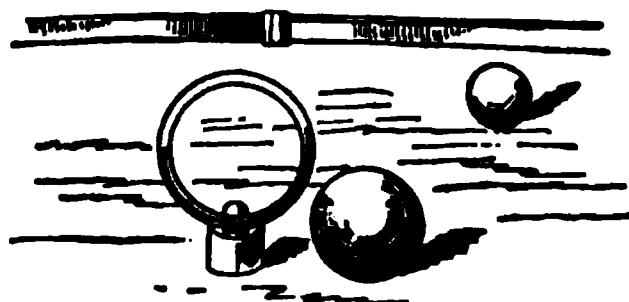


Fig. 2.

points. No ball must be pushed or thrown through the ring. Each player has only one turn, whether he is successful or not. Instead of trying for the ring, any one may endeavor to knock another's ball out of position, or to strike the side of

the ring, and so turn it edgewise to another ball. Skilful players can sometimes send their balls through the ring when it is turned almost edgewise, by striking it on one side, causing it to turn around and catch the ball. The ground may be surrounded by a wooden border, one side of which is seen in Fig. 2.

LAWN TENNIS. See **TENNIS**.

LAWYER, a game played by any number of persons, who usually sit in two rows of chairs, facing one another, excepting one who stands between the rows. The player who stands, called the lawyer, asks a question of any of the others, and the one who sits opposite must answer it. If the player addressed answers, or if the one opposite him does not begin to do so before the lawyer counts ten, the one making the mistake must pay a forfeit and take the lawyer's place. If both make mistakes, the lawyer may decide which is to take his place. The one who answers must do so as if he had been spoken to directly; thus, if the question is "Are you fond of rowing?" the opposite one must not answer, for instance, "Yes, *he* enjoys it very much," but "*I* enjoy it very much." The players may sit in a circle instead of in two rows. In this case the one opposite may answer, as before, or the right or left hand neighbor of the person questioned, as is agreed upon beforehand.

Though the questioner is now usually called the lawyer, the game is probably named from the fact that the questioned player has some one to answer for him, just as a lawyer sometimes acts for his client.

LEAD, Experiments with. 1. With a sharp knife cut away part of two leaden bullets so as to make a flat surface on each. Press these surfaces together with a slight screwing motion, and they will adhere so tightly that it is difficult to pull them

apart. In this way several bullets may be made to stick together.

2. Melt some lead in an iron spoon. A gray scum will form on the top. Still holding the spoon in the fire, stir the lead with a piece of iron, and in time it will all turn to the gray substance that formed the scum. If the lead be weighed before it is melted, and again after it has turned to the gray substance, it will be found to have gained in weight. This is because the gray substance has in it not only the lead but also some **OXYGEN** from the air, which united with the lead to make lead oxide, or litharge.

3. Put a teaspoonful of litharge in a quarter of a glass of strong vinegar. The vinegar will dissolve it, forming lead acetate or **SUGAR OF LEAD**, with which may be performed the experiments described under that title. It is very poisonous, so must be used carefully.

4. Pour a few drops of sulphuric acid into the vinegar in which the litharge was dissolved, and a white powder will at once appear. This is sulphate of lead. The lead, having a greater liking for sulphuric acid than for vinegar, left the latter and united with the former.

LEAD TREE, a curious formation made by the action of zinc on a salt of lead. Make a strong solution of lead nitrate or lead acetate, suspend in it a strip of zinc, and set it in a quiet place. Beautiful lead crystals will form in the liquid, resembling the growth of a plant. The cause is chemical action. The acid in the lead salt (see **SALTS** in **C. C. T.**) prefers zinc to lead, and so takes it up instead. The lead as it is thus slowly displaced forms the crystals seen.

LEAF PRINTS. Prints of leaves resembling lithographs may be made by the following method. The implements required are a small ink-roller, such as is used by printers to ink type (one three inches long may be bought for forty cents), quarter

of a pound of dark green printers' ink, which is sold in tubes, and some unglazed paper. The ink must be thinned by adding two or three drops of balsam copaiba to a salt-spoonful of ink. The thinned ink is spread evenly on a pane of glass with the roller, which is then passed over the leaf it is desired to print. If the leaf stick to the roller, it is a sign that the ink needs more thinning. The leaf is then pressed down on the paper and leaves a perfect impression. The paper should be slightly dampened, which is best done by keeping it in the cellar. If the leaf is very large, it should be inked a little at a time. If it is finely veined, the under surface may be used to print from: otherwise the upper surface gives the best results. If the leaf be soft, it should be covered with a few thicknesses of newspaper before printing, and if it is irregular in thickness, the thinner parts may be covered with paper. The best way to apply the pressure is with an ordinary copying press; but it may be done in any other way, as for instance with books, or merely by rubbing the thumb over the leaf. With practice excellent leaf-pictures may thus be made.

LEAF SKELETONS, the bleached framework of leaves, from which all the skin and pulp have been removed. They can be used in various ways for decoration. The best time to prepare them is early in the summer, when the leaves are tender. Dissolve four ounces of washing-soda in a quart of boiling water and add two ounces of slaked lime. Boil this liquid a quarter of an hour, and then, after it has cooled, pour off the clear fluid. Boil the leaves in this till the skin and pulp are so tender that they can easily be removed from the skeleton by rubbing between the fingers. Rub them thus carefully in cold water, and then bleach them by soaking fifteen minutes in a quart of water

to which has been added one teaspoonful of chloride of lime. Dry the skeletons by rubbing them gently on blotting paper.

LEAP-FROG, a game played by any number of persons, each of whom in turn leaps over the others, one by one. The players stand in a row, about fifteen feet apart, each resting his hands on his thighs and bending his head forward. This is called "making a back." The player at one end of the line takes a short run, and leaps over each of the others, placing his hands on their backs and letting his legs pass one on one side and one on the other. The player who is leaped assists the leaper by rising slightly and then stooping. The players may stand side by side, in which case the leaper goes over them sidewise, or they stand in file, in which case he leaps from their backs over their heads. When he has thus gone over the whole line, he "makes a back" at the proper distance, and the player who is thus left in the rear becomes the leaper.

Foot and a Half, a leap-frog game where the person to be jumped over moves by degrees farther and farther from the point where the jump begins. A line is drawn (sometimes called the "garter") to mark the beginning of the jump, and whoever steps on it must take the place of the player leaped over. After the players in turn have leaped, the last cries "Foot and a Half!" and the player who is making the back thereupon places his right heel in the hollow of his left foot, advances the latter so that its hollow covers his right toe, and then brings up his right foot to its original position. The players then leap again, always beginning at the "garter," after which the back advances again in like manner, and the game goes on till some one treads on the "garter," or fails in leaping. The unsuccessful one then

makes a back and another game begins.

This game is called also "Fly the Garter" and "Foot it." Sometimes it is varied by allowing the last player in the first round to make a back at the spot he reaches in his jump. The back thus changes at each round, and as the position is moved forward such a distance each time, the players are often allowed one jump, or a hop, skip, and jump, between the garter and the back.

In France Leap-frog is called *Le Saut de Mouton* (The Sheep's Leap). Besides the varieties described above, French boys play one called *Saut de Mouton avec Mouchoirs* (Sheep's Leap with Handkerchiefs), in which each leaper is required, in his first turn, to lay his handkerchief on the back of the player he leaps, and at his second turn to pick off his own handkerchief, leaving the others. Another variety is called "Sheep's Leap with Crowns." Each leaper places on his head a crown made of a twisted handkerchief, and at the moment of leaping takes it off and throws it on the ground before him. At his second turn he must pick up his own crown without moving his feet from the place where he alighted, though he may bend in any direction or even throw himself at full length. If his crown touch any of the others, or if he touch any of them in picking it up, he must make a back in his turn. The boy who makes the back is called in French *Le Patient* (The Patient).

LEGITIMIST, THE, a SOLITAIRE game of CARDS, played with two full packs. A King is placed at the player's left, and then in order, as they appear, a Queen, Knave, Ten, Nine, Eight, Seven, and Six. On each of these a card next below it in rank is placed, and so on, till, when the piles are completed, the top cards will be Ace, King, Queen, Knave, Ten, Nine, Eight, and Seven. The cards that cannot be used at

once are placed aside to form stock, which can twice be taken up, shuffled, and relaid. The player must take care to notice when his piles are completed. As each ends with a different card, an inattentive player is apt to build some of them too far.

LENSES, Experiments with. Lenses are described in C. C. T. Very fine ones can be bought of an optician, but the experiments described here can be performed with simple ones. A burning glass is a double convex lens, and, so are some spectacle glasses.

1. *Photographic Lens*. Let one person hold up a handkerchief, or a blank sheet of writing-paper, ten or twelve feet in front of a window, and let the other hold a lens between the paper and the window. By moving it, now nearer the paper and now nearer the window, a place will be found where a picture of the window, upside down, will be seen on the paper. The picture will be plainer if the other windows in the room be closed, and still plainer if the lens be surrounded with a piece of pasteboard, so that no light can shine on the paper except that which passes through the lens. The picture is called an image. In like manner an image of any thing bright can be made. This is the way an image is thrown on the plate in PHOTOGRAPHY.

2. *Microscopic Lens*. Hold a lens very close to some small thing, and move it about a little. A place will be found where, by looking through the lens, the small object will appear larger. This is the way a lens is used in The MICROSCOPE.

3. *Telescopic Lens*. Let one person hold a lens, as in Experiment 1, and then let the other, dropping the handkerchief or sheet of paper, look through a second lens, placed close behind it, at the window. Move it forward and backward a little till a clear view of objects outside the window is obtained. This is the way

lenses are used in the most common kind of TELESCOPE.

4. *Burning Glass.* On a sunny day, hold a lens so as to make a bright image of the sun on a board. The board will soon begin to smoke because of the heat of the image.

5. *Caustic Curve.* Instead of holding the board squarely in front of the lens, tip it so that the rays will strike it slantingly. A curve of light, called a caustic, will be seen on the board. This is because most lenses do not turn the rays accurately to one spot.

6. *Prismatic Lens.* Look through a lens at a line of light such as the edge of a white house on which the sun is shining. It will probably appear colored, since the lens acts like a PRISM.

7. *Water Lens.* A good lens is made by placing a drop of water on a pin-hole in a piece of card-board. This magnifies small objects very well.

8. *Bottle Lens.* A glass bottle filled with water may be used as a lens, as shows in the illustration.

Bottle Lens.

LEYDEN JAR, a device for obtaining large charges of electricity. A simple one can be made by filling a glass tumbler about two thirds full of shot and inserting a silver teaspoon (see Fig. 1). The tumbler must be held in one hand, while the teaspoon is presented to an ELECTRIC MACHINE, or an ELECTROPHORUS. If the latter is used,

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bottom and gives contact with the inside coating. The upper end of the wire should terminate in a metal ball. A leaden bullet may be soldered to it, or a wooden ball coated with tin-foil may be used. This jar may be charged and used exactly like the one already described, but it is not necessary to take it in the hand at all. All that is required is that the outside have some connection with the ground while the knob is receiving shocks. This can be effected by winding around it, as it stands on the table, one end of a metal chain, and letting the other hang on the floor. Such chain can be bought at any hardware store.

To discharge the jar when the charge is too great to be taken through the body, a discharger is necessary, which may be made thus (see Fig. 3): Take a bottle, small

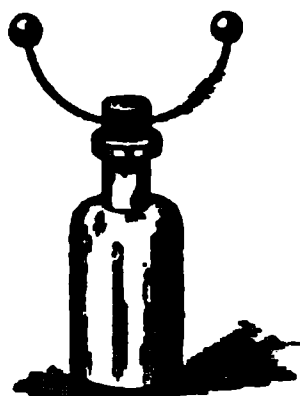


Fig. 3.



Fig. 4.

enough to be held conveniently in one hand, and through the cork at right angles to the bottle, pass a piece of copper wire twelve or fifteen inches long. Bend the wire into a semicircle curving outward from the bottle, and fix balls on the ends like that on the jar. By holding the bottle in the hand and touching one ball to the knob of the jar and the other to the outside coating, as in Fig. 4, the jar may be discharged without injury, the electricity passing through the copper wire.

Fulminating Pane, a kind of Leyden jar made of a flat pane of glass having tin-foil pasted on both sides. The edge of the glass should be left

uncovered at least an inch all around the foil. The pane is charged and discharged just like the jar; that is, it is charged by placing one coating in contact with an electrical machine, and the other in connection with the ground, and discharged by joining the two coatings with some conductor of electricity.

The explanation of the way in which the jar or pane acts is this: One coating, being charged with one kind of electricity, positive for instance, attracts the negative electricity on the other coating, and repels its positive to the ground. The two kinds of electricity in the jar are prevented from uniting by the glass, but when the coatings are joined they rush together. Jars of thin glass will hold larger charges, because the nearer the coatings are the stronger the attraction is; but on the other hand, the glass must not be too thin or it may be broken.

EXPERIMENTS.

1. Make a Leyden jar whose coatings can be removed while it is charged. This can be done by using a smooth glass tumbler as the jar, and making the coatings of several thicknesses of foil, so that they will keep their shape when removed. The coatings are not pasted to the glass, and the rod and knob of the ordinary jar are omitted. Fasten a bit of sewing silk to the inside coating. After charging the jar, first lift out the inside coating, and then lift the glass from the outer coating. If the two coatings are now joined there will be no discharge; but after they are replaced the jar can be discharged. The reason of this is that the charge is not contained in the coatings, but in the substance of the glass.

2. Make a jar whose coatings are of mercury, by setting a small tumbler in a larger one, and pouring mercury between them and into the smaller one. Charge this jar as before, and then, lifting the small glass

out, pour its contents into the large glass, and mix the two coatings together. Set the jar up as before, and the jar can then be discharged, though its coatings have been mingled. The reason is the one already given in Experiment 1.

3. Charge a jar, and after letting it stand several minutes discharge it. Let it stand a minute longer when it may be discharged again without charging. In this way several sparks may often be obtained from one charge, each more feeble than the preceding. The reason is that the electricity penetrates the glass, and does not come out all at once.

4. Take two call-bells; place them on glass dishes and connect one to the knob of the jar and the other to the outside coating by means of chains or wires. Suspend a bit of wood coated with tin-foil, the size of a small pea, by a silk thread just midway between the two bells. The jar being charged, the copper will swing backward and forward from one bell to the other, ringing each as it strikes. After a time this will discharge the jar, the electricity being carried in small quantities from one coating to the other by the copper. If the experiment does not succeed, it may be because the bells are too far apart, because the bit of copper is too heavy, or because the jar is not charged enough.

5. Make a Leyden jar whose outer coating consists of varnish sprinkled while yet soft with metallic powder, for instance the bronze powder used in painting. Tin-foil is pasted over the bottom, and there is also a band of foil about an inch wide around the jar at the top of the outer coating. The wire connecting with the inside coating is bent over on the outside till the knob is about three quarters of an inch from this band of tin-foil. The jar is then hung by the wire to the knob of an electrical machine (see Fig. 5). When the machine is worked, brilliant sparks

pass between the knob to the outer coating, lighting up the jar.

6. **Leyden Battery.** A battery is made up of several jars, all the outer coatings and all the inner coatings being joined. This can be effected by placing the jars in a wooden box

Fig. 5.

lined on the bottom with tin-foil, and joining the knobs with copper wire. A strip of tin-foil leads from the bottom of the box to the edge, and when this strip is connected with one of the knobs by a discharger, the battery is discharged. The battery gives a powerful spark, and the experiments which follow can be performed better with it than with a single jar.

7. Through the corks of two glass bottles pass crosswise thick copper wires or rods, having at one end balls like that on the jar, and bent at the other into hooks. Glue a piece of glass an inch or two square flat on the top of the cork of a third

bottle, somewhat lower than the other two. Place the taller bottles so that the knobbed ends of the wires will touch the glass plate, and be about an inch apart. Connect the hooked end of one of the wires by a wire or chain to one coating of a Leyden jar or battery, and that of the other wire to the other coating by a discharger (see Fig. 6). A

spark will pass directly across the glass, and through any substance placed on it. By this means the effect of the electric spark on all kinds of substances can be observed. By placing pieces of different kinds of metal close to the knobs so that the spark will pass between them, its color can be varied. This is because the heat turns a little of the

Fig. 6.

metal to vapor, which colors the spark. The color can also be varied by passing it through different gases (see HYDROGEN and CARBONIC ACID). If the charge is passed through a small wire it will heat it red hot, or perhaps will melt it.

If gunpowder be placed on the glass plate, the discharge will scatter it without setting it off; but if a wet string be placed in the circuit, the spark will light the powder. The reason is that an ordinary spark is too sudden to set the powder off, but the wet string makes it a little slower.

If the spark be passed through a lump of sugar, one or more eggs, or fruit, they will be lighted up and shine (if the experiment be tried in the dark) for a little while after the spark has passed.

If the spark be passed through a sheet of gold leaf pressed between two pieces of silk or glass, the gold will be turned to a violet powder.

If the spark be passed through a bit of unglazed paper, wet with a solution of iodide of potassium, brown spots will appear on the paper. This is because the iodide is separated into iodine and potash, and the former makes the brown spots.

8. Place a steel wire inside a glass tube, and wind around it insulated copper wire. Discharge a Leyden battery through this wire, and the steel wire will become a MAGNET.

9. Spin by means of a TWIRLER a disk on which are lines, figures, or pictures. If the disk spin rapidly none of the figures will be visible; but if the room be darkened, and a Leyden jar be discharged, the disk will seem to stand still, so that everything on it can be seen plainly. This is because the spark lasts a very short time, so that while it lights the room the disk changes position very little, and seems to the eye to be perfectly still.

10. Twist together two thickly insulated pieces of copper wire four or five feet in length. (Insulated wire may be bought of a dealer in telegraph supplies.) Hold the ends of one piece in the hands, and discharge a Leyden jar. A shock will be felt, although the two wires are not connected. The electric current which passes through the hands in this case is said to be an "induction current."

11. Place a fulminating pane on a table, the lower surface being connected with the earth. Lay a coin on the upper surface, and then charge the pane. If any one now try to remove the coin he will receive a shock. The coin may safely be offered to any one who will pick it up at the first trial.

LIGHT MEASURING, or PHOTOMETRY. The intensity of light is measured in "candle-power;" so

to measure the brightness of a lamp it is necessary to find how much brighter or dimmer it is than a candle. Two of the simplest ways are given below:

1. About six inches in front of a white wall stand a bottle with a stick fixed in its mouth (Fig. 1).



Fig. 1.

Place the candle *b* about two feet distant, and the lamp *a* by its side. Each will throw a shadow of the

Fig. 2.

stick on the wall; that thrown by the lamp is marked *a'*, and that of the candle *b'*. By moving either lamp or candle sidewise, the edges of the shadows may be made just to touch. It will be seen that one is not as dark as the other. Now move the lamp slowly back, keeping

the edges of the shadows close together, until they are of the same shade. Then measure the distance of the lamp and candle from the wall, and find out how many times farther the lamp is than the candle. The square of the number thus obtained will be the candle-power of

the lamp. Thus, suppose the candle is two feet from the wall, and the lamp six feet. It is three times as far as the candle, and its candle-power is three squared, or three times three, that is, nine. The standard candle is one weighing one sixth of a pound, and burning 120 grains an hour. A "number six" sperm candle with the wick kept trimmed to about half an inch will be nearly right. Fig. 2 shows the same kind of comparison made between a lamp, C, and a candle B. The screen is a sheet of paper held between two books, and the object that throws the shadow is an unlighted candle, A. The shadows are shown at E and F.

2. On a piece of smooth, unglazed paper make a grease-spot the size of a quarter-dollar, so that light will shine through it evenly and clearly. Pin the paper to two books set up on each side of it, and place the candle on one side and the lamp on the other, at equal distances. From the candle side the spot will now appear light on a dark ground, and from the lamp side it will look dark on a light ground. The reason of this is that the grease-spot lets through the light, hence it looks brighter on the side opposite the brighter light. Now move the lamp slowly away, or bring the candle nearer, till the spot appears of the same shade as the surrounding paper. Measure the distances of lamp and candle, and find the candle-power as before.

EXPERIMENTS.

1. Find the candle-power of a lamp and then put a piece of glass in front of it, and find the candle-power again. It will be much less, as only part of the light gets through the glass.

2. Find the candle-power of a lamp with the flame turned broad-side and then edgewise. It will be greater in the former case.

LIVES, a game of CARDS, played

by any number of persons with a full pack. The dealer gives each player, in order, one card. Each player in turn, beginning at the dealer's left, now has the right to exchange his card for that of his left-hand neighbor. If he does not choose to do so, he says, "I stand." If he does choose, the neighbor is obliged to exchange with him, unless he holds a King. The dealer, instead of exchanging, cuts the pack, if he wishes, and takes a card from the middle. As the object is to avoid holding the lowest card, the players who have high cards should "stand," and those with low ones should exchange. Ace counts as the lowest card. If a player exchange an Ace, Two, or Three, he must announce it aloud and those who have higher cards will of course stand. Any player who gives to his right-hand neighbor a worse card in exchange will also stand. The holder of the lowest card, when all have either stood or exchanged, is said to "lose a life." If the dealer, in drawing from the pack, get a King, he loses a life. Any player losing three lives must retire from the game, which is continued till only one player is left, who is declared the winner.

This game is called in England "Ranter-go-Round." It resembles **COMMERCE**, and may be the original form of that game. A former way of scoring was with counters on a board resembling a **NINE MEN'S MORRIS** board, the players' counter being pushed nearer and nearer to the centre as his "lives" were successively lost. When the counter reached the centre, its owner went out of the game.

LETTERS. See **LOGOMACHY**.

LITTLE LOTS, a **SOLITAIRE** game of CARDS, played with a **EUCHRE** pack. The cards are dealt in eight piles of four each, only the last or top card of each pile being turned face upward. Any two top cards that match must be laid aside, and

the next cards turned up in their places. This is repeated as long as possible, and if all the cards can be thus matched the game is won. Should any pile remain, containing only two cards, the player may look at them, and if they match they are laid aside like the others.

This game is said to be a favorite in Switzerland.

LIVING STATUARY, tableaux in which the performers are dressed to represent statues, either singly or in groups. The statues are draped entirely in white cloth, wear cotton flannel skull-caps to which cotton wicking is sewed for hair, white stockings, white slippers or sandals, and white cotton gloves, to which are sewed sleeves made of white cotton stockings. The face is whitened with fine chalk, magnesia, or bismuth. If the drapery is arranged skilfully and the statues can remain perfectly motionless, the effect is fine. Celebrated statues or groups may thus be imitated, or entirely original ones may be arranged. Pedestals may be made of tables and boxes covered with cotton sheeting. The statues show best against a black or dark background in a pale blue light, which may be produced by putting light blue glass in front of the lamps. All the "properties" that appear in the groups must either be covered with white cloth or painted white.

Living statuary is sometimes used in connection with ordinary tableaux, to adorn a royal palace or garden.

LOGOMACHY, a game played by any number of persons with small squares of cardboard, on each of which is printed a letter of the alphabet. It is sometimes called "Letters," and "Word-making and Word-taking." The players sit around a table, in the middle of which the cardboard letters are heaped, blank side upward. They are thoroughly mixed and then each player draws a letter to see which shall open the

game. He who draws a letter nearest to the beginning of the alphabet is the first player. After the letters thus drawn have been returned to the pile, which is mixed again, the first player draws a letter and places it, face upward, by itself on the table to begin what is called the pool. The player on his left does likewise, and so on, in order, till some one draws a letter which forms a word with others in the pool. He then places those letters in front of him so that they spell the word. The next player may take his word from him by combining with it his drawn letter, or any letters in the pool, or both, so as to form a different word or he may combine his drawn letter with others in the pool to form another word. If he can do neither, he places his drawn letter in the pool like the others. So the game goes on, each player having the chance of taking a word from any other player, making a new word of his own, or adding his letter to one of his own words. He wins who first gets a number of words agreed upon beforehand (usually ten) and holds them while a round is played. Thus, A may get ten words, but he has not won till B, C, D, and the others have each a chance to take one or more from him. If they cannot, A is the winner; but if one of his words is taken from him, the game goes on as before.

In this game, the practised player knows by heart the words that can be taken away, and what letters can take them, so he plays quickly; but the beginner must study each word carefully. If he can take no word, he should add his letter to one of his own words, if possible, to prevent its being taken by another player. Some words, especially the small ones are almost sure to change hands at once. Thus, "pat" can be taken by *e* (making "pate," or "tape") by *h* ("path"), by *n* ("pant"), by *r* ("rapt" or "part") or by *s* ("spat" or "past"). This is

evident, but few see before some study (for instance) that "stream" can be taken by a *y* (making "mastery") or others still more difficult.

It is a good plan for a beginner to practice alone, forming words, and twisting them about in every possible way, so as to become familiar with the changes that may be made. If the player can make a word either from the pool or by taking one from another player, he should in general prefer to make the one that is least likely to be taken from him. But if one of the players has nearly ten words, the others should try, first of all, to reduce his number.

The rules of Logomachy differ with the players. Certain points should always be settled before the game, such as the dictionary to be used as a standard, the use of plurals, etc., and the length of time to be allowed for each play. The rules that follow may thus be modified to suit the players.

RULES OF THE GAME.

1. No one shall touch the pile of letters but the one whose turn it is to play.

2. The player must draw the letter which he touches first.

3. While he is considering his play, his letter must lie on the table, in plain sight.

4. A letter must be played within two minutes after it is drawn.

5. Each player's words must be in plain sight, and turned so that the others can read them most easily.

6. No player may form a word that he cannot define, at least well enough to show that he is not forming it at random, in hope that such a word may be found in the dictionary.

7. Singulars and plurals shall be considered different words. [Sometimes a plural in *s* is considered the same word as its singular.]

8. If any player can form or take a word with the letters in the pool, he may do so before drawing his letter.

The word Logomachy is formed Greek words, and means from two Word-contest.

LONDON BRIDGE, a game played by any number of children. Two leaders form an arch with uplifted hands, under which the others march in line, singing, "London Bridge is falling down, my fair lady!" When they desire, the leaders lower the arch, catching one of the players. The one thus caught is asked which of two articles he will have, and according to his answer, as previously agreed, he is made to stand behind one or the other of the leaders. When all have been caught, the leaders and their followers end the game by pulling against each other as in a TUG OF WAR. Sometimes the song sung while the line is marching has several verses.

History. This game is mentioned by the French author, Rabelais, in 1533, under the name of "Fallen Bridge." In Germany the keepers are called Devil and Angel, King and Emperor, or by other names. In France the game is called "Heaven and Hell." The Germans of Pennsylvania call it "*Die Holländisch Brück*" (The Holland Bridge), and in Massachusetts it is sometimes called "Charlestown Bridge." In parts of Ireland an actual bridge is made of boards, and one player takes the part of the Devil, who breaks it down at intervals, while the song is sung.

LOTO, or **LOTTO**, a game of chance played by any number of persons, with numbered cards and counters. The cards are usually 24 in number, and each is divided into 27 squares in three rows. Five of the nine squares in each row have numbers on them and four are blank; thus there are 15 numbers on each card. The whole 24 cards have thus 360 numbers, which are the

tally. No articles of iron or steel should be anywhere near it. It will presently point north and south, and the ends can then be marked with the letters N and S, or in any other way desired. Or the poles can be discovered at once by means of a pocket compass. The end of the magnet which attracts the north end of the compass magnet is its south pole. The same pole should repel the south end of the compass magnet. It is just as well to test the magnet, even if the poles are marked, for it may be a French magnet; and as in France the words north and south, applied to the poles of a magnet, mean just the opposite of what they do here, the result would be confusing.

EXPERIMENTS.

1. *Magnetisation.* Lay a needle on the table, and draw one of the poles of the magnet over it several times, always in the same direction. The needle will become magnetic, the end at which the magnet pole began to be drawn over it becoming a pole of the same name. A better way is to use opposite poles of two magnets, bringing them together in the middle of the needle, and drawing them apart toward the ends. It is well to magnetize several needles of different sizes, for use in the following experiments.

2. Try to magnetize pieces of soft iron—nails, for instance. It will be found that they became magnets instantly, as soon as the magnet touches them, or even when it is held near them; but when it is taken away the magnetism leaves them, except, perhaps, a very slight trace. To detect very feeble magnetism, not strong enough to attract even very small bits of iron, use a pocket-compass. Apply the compass to the ends alternately, and if one end of the needle is attracted at one end and the other at the other, it is certain that the object is a magnet.

3. *Magnetization by the Earth.* Hold an iron poker nearly, but not

quite, vertical, the lower end pointing a little to the west of north. By testing with a compass-needle, as above, it will be found to be a magnet; but as soon as it is held in any other position it ceases to be so. It may be made to retain some of its magnetism for a short time by striking it several sharp blows with a hammer while it is held in the position just described.

4. *A String of Magnets.* Apply a small nail to the end of a magnet held in the air. The nail becomes a magnet for the time being, and will thus support another nail. In this way a long string of nails can be hung from the original magnet when it is a strong one. But if the first nail be pulled from the magnet, its magnetism leaves it, and hence the whole string of nails falls apart.

5. *Magnetic Transparency.* Put a piece of paper between the magnet and a piece of iron. The iron will be attracted as strongly as before. If iron filings be scattered on a sheet of paper, they will arrange themselves in different figures if the pole of a magnet be moved about under the paper. Substances through which a magnet will attract in this way are called "magnetically transparent." It will be interesting to try a large number of substances, and see which are magnetically transparent and which are not. The substances must all be thin, unless the magnet used is very strong.

6. *Magnetic Curves.* Place a sheet of paper over a magnet, and scatter over it fine iron filings. Gently tap the paper, and the filings will arrange themselves in lines, following what are called the "lines of force" of the magnet. If two or more magnets be used instead of one, and placed in different positions, the lines of force become quite complicated. They will differ according as the magnets are laid on their sides, or held under the paper endwise, one pole touching the paper. The illustration shows

them as they appear over the poles of a horse-shoe magnet. To preserve these curves, prepare the paper by rubbing over it a piece of wax, the end of which has been warmed. The paper will thus be coated thinly with wax. When the filings have arranged themselves, hold the paper

over a hot stove; this will melt the wax, which, when it has cooled, will retain the filings in place. A small magnetic needle suspended close over the curves, while the magnet is still beneath, will set in the direction of the curve at the point where it is. A method by which the filings

Magnetic Curves.

may be made to arrange themselves as they fall, without any jarring, and hence may be arranged directly on a freshly-varnished pane of glass, is as follows: Magnetize two needles of the largest size so that the point of one and the eye of the other shall be north poles. Stick them side by side in a piece of cork, and the free ends will then be opposite poles.

Pick up a quantity of filings with these needles, shake off the loose ones, and then, holding them over the glass under which is the large magnet, jar them off a few at a time. Each filing has been magnetized by its contact with the needle, and hence will arrange itself properly as it falls.

Drop a little melted paraffine on



Experiment 7.

the first layer of filings, and hold over them a hot fire shovel that it may melt and run in among them thoroughly. Then shake on another layer in the same way as the first,

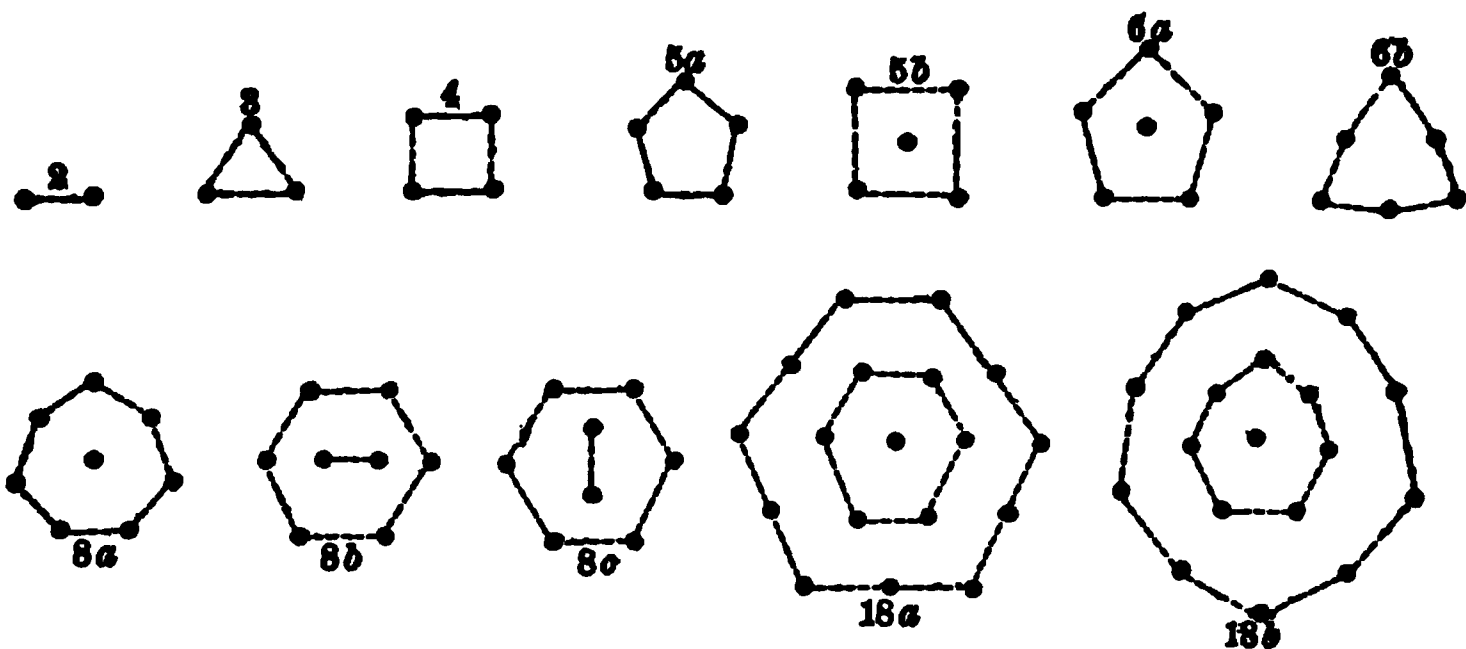
and so on. In this way the curves may be built up into the air, presenting many striking forms.

7. *Magnetic Poles.* Take two bar magnets of equal strength, and hold-

ing one horizontally, hang a nail or key from one of its poles A. Then slide the other over it, the pole B of opposite name to the end from which the nail hangs being in advance. When it comes above the nail, the nail will drop, the influence of the two opposite poles balancing each other.

8. Fill a glass tube with steel filings, or small steel brads, and magnetize it as in Experiment 1, taking care not to shake it. It will act in all respects like an ordinary magnet, but if it be shaken, so as to alter the position of the filings, the magnetism will disappear. This is not because the filings are demagnetized, but because, their poles being turned in opposite directions, the effects balance each other.

9. Take a short iron bar, a stove-holder, for instance, and lay it on a table near a compass, so that one end of the holder may be on one side of the north end of the compass-needle, near enough to draw it aside a little. Approach the north pole of a magnet to the other end of the stove-holder and the compass-needle will recede. The reason is, that at first the compass-needle made the iron a magnet with its nearest end a south pole, but afterward the influence of the stronger magnet turned it into a magnet with poles reversed. If, instead of the northpole of the magnet, the south pole be presented to the stove-holder, the compass-needle will be attracted more strongly instead of being repelled.



Floating Magnet Figures.

10. Try the above experiment, using a large mass of iron, a stove, for instance, instead of a small bar. The result will be the same, but will take place more slowly. The reason is that magnetism takes time to travel through iron, and this time may be noticeable in the case of a large mass like a stove.

11. *Repellent Magnets.* Tie two bits of iron wire to the ends of a thread several inches long, and hang them by the middle of the thread over a pin in the edge of a mantel, or in any way so that they do not touch the wall. Then bring either pole of a magnet underneath

the wires, and they will repel each other more and more, as the magnet is held nearer. The reason is, that the wires both become magnets under the influence of the magnet under them, and their like poles being near each other, they repel each other. If sewing-needles be used instead of iron wire, they will continue to repel each other slightly after the magnetism is taken away, having become permanently magnetized.

12. *Floating Magnet Figures.* Magnetize any number of steel sewing-needles of the same size, so that their points are north poles

and float them vertically in water by sticking them through bits of cork so that their eyes just project above the cork. The pieces of cork should be as small as will sustain the needles. Hold the north pole of a strong magnet above the floating needles, and they will group themselves in regular figures, depending on the number used. Some of these are shown in the figure. It will be seen that sometimes the same number of needles can form more than one figure, and jarring the vessel of water often causes one figure to change into another. In the diagram, the number of magnets in the figures is marked over or under each, and when the same number form more than one figure, the different ones are denoted by letters.

13. *Magnetism and Heat.* Heat a nail red-hot and then try to attract it by a magnet. It will be found impossible, but as the nail cools it will be more and more attracted, till when it has entirely cooled it will be attracted as strongly as ever.

Heat a magnet red hot. It will lose its magnetism completely, and will not regain it on cooling.

14. *Magnet and Needle.* A horse-shoe magnet must be used for this experiment. Magnetize a threaded needle by rubbing it always in one direction on one pole, returning it in an arc through the air. Taking the end of the thread (which may be only an inch or two long) between finger and thumb, suspend the needle over the pole that attracts it, the point being about quarter of an inch from the magnet. Then, with a circular sweep of the hand, to keep the point in its position, draw the eye down toward the other pole. If this is done skillfully, the needle will remain suspended horizontally just above the magnet.

Electro-Magnets. A bar electro-magnet can be made by winding insulated copper wire around a bar of soft iron. To make horse-shoe

magnets, which are more generally useful, a bent bar is similarly wound, but it must be remembered that if one pole is wound from left to right, the other must be wound from right to left. The wire will

Electro-Magnet.

then be arranged as if a single bar had been wound in the same direction for its entire length and then bent. This will be seen by winding string around a flexible stick, and then bending it.

The size of wire used depends on circumstances. The larger it is, the less resistance it has to the electric current; but on the other hand, the larger it is, the farther removed each successive layer of wire is from the bar, which lessens its effect. So, if the magnet is to be used in a long circuit, where the resistance is great any way, and the addition of more makes little difference, small wire should be used; otherwise, larger wire. Several layers of the wire should be wound on: trial will show the best number in each case. The ends of the winding wire being connected with an ELECTRIC BATTERY, some of the experiments described above may be repeated. (See also TELEGRAPHS.)

MAIDS AND BACHELORS, a game played by equal numbers of boys and girls. The boys go into an adjoining room, and then each boy and each girl chooses a trade or employment, which must not be the same for any two boys or two girls. The girls march around in a circle, each

making signs to represent the occupation she has chosen; the carpenter pounding nails, the washerwoman washing clothes, and so on. The boys then form in line and march in, each representing his chosen trade in like manner. The boys walk around the girls in the opposite direction and, at a signal, each seeks the one with the same trade as himself. Those left without partners are called Maids and Bachelors.

MAKING A WILL, a game played by any number of persons, one of whom represents a lawyer, and the other his client, who is about to

make a will. The lawyer writes down a numbered list of articles supposed to belong to his client, and then asks him to say to whom he will leave each, mentioning them only by number. He writes down what the client says, and when the latter has bequeathed all, the lawyer reads them, with the names of the persons to whom they have been left. Two other players are then chosen as lawyer and client.

MANOMETRIC FLAME, Experiments with. Take a piece of pine, A (See Fig. 1), one inch thick, one and one half inches wide, and nine inches long, and bore, one inch

Fig. 1. Manometric Flame Apparatus.

from its top, a hole an inch in diameter, and one eighth of an inch deep. In a block, B, of the same width, three quarters of an inch thick and two inches long, bore a similar hole. Bore a half-inch hole through the first piece in the centre of the shallow hole, and through the second piece bore two three-sixteenth inch holes; one straight through the centre, and one obliquely downward just below it, but open-

Fig. 2. Manometric Flames.

ing into the shallow hole. Fit short glass tubes E and C into the half-inch hole, and the oblique three-sixteenth inch hole, and into the other hole fit a glass jet, D (see CHEMICAL EXPERIMENTS), bent at right angles. All the tubes can be fitted by wrapping them in paper coated with glue. Over the shallow hole in A, glue a piece I, of very thin sheet-rubber, and then glue the other block to this, so that the rubber separates the shallow holes. Remember that the end of the nine-inch piece with the hole in it goes to the top, and that the oblique hole

in the other block, must point downward. Fasten the two blocks firmly together with twine. Secure the nine-inch piece to a board, so that it will stand alone. Attach to the largest tube a piece of large rubber tubing with a paper cone, G, at the end, like that used in some of the experiments on SOUND FIGURES.

From a piece of wood one foot long, four inches wide, and quarter of an inch thick, cut a square, with two rods, H and K, projecting from it, as shown in the illustration. On each side of the square fasten a piece of thin silvered glass M, by winding twine around the top and bottom. Point the shorter rod bluntly, and with it make a dent for it to be twirled in, in a piece of wood, K, which is glued on the end of a brick, L. Connect the oblique tube C with a gas burner by rubber tubing. The gas will enter one side of the box formed by the shallow holes in the blocks, and, issuing at the jet, may be lighted. Now, if a note be sung into the cone, the vibration of the air on the other side of the sheet-rubber will push it in and out, and so make the gas-flame rise and fall. To see it rise and fall, however, the mirror must be used. Hold the mirror by the longer rod, and placing the shorter in the dent prepared for it, just in front of the flame, twirl it between the finger and thumb. When no sound is made, the flame as seen in the mirror will be drawn out into a long band of light. But when a note is sung into the cone, this band breaks up into a row of tongues of flame, showing that the gas-jet is jumping up and down very rapidly. The appearance of the tongues differs with the note sung, or the noise made in the cone, and many interesting experiments can be tried with different notes and sounds. Fig. 2 shows some of the various appearances.

These flames are the invention of Prof. König, a German scientist,

and are called "Manometric," from the Greek *manos*, thin, and *metron*, measure, because the varying density of the air on one side of the rubber is, as it were, measured by the jumping up and down of the flame.

A simpler apparatus than the above, which often gives good results, is made from a tin tube narrowed at one end, so that by means of rubber tubing a glass tube may be fastened to it. The end of the glass tube, which is drawn out to a jet, is placed in the middle of a candle-flame. By singing into the tube and examining the flame with a revolving mirror, as before, the vibrations may be observed.

MAP MAKING. The simplest kind of map to make is one of a room, or what is called a "ground plan." The first thing to decide on is the scale, or size, of the map. This should depend somewhat on the division of the scale or rule used. If the inches are divided into tenths, then five feet may be represented on paper by one inch, so that one foot would be represented by two-tenths of an inch. But if the inches are divided into eighths, then it would be better to represent four feet by an inch, so that one foot would be represented in this case also by two of the small divisions. The simplest kind of a room to map is one where all the corners are right angles. All that is needed is a "square" or "triangle" having one right angle, so that a "square corner" can be drawn from it. Begin at any corner of the room, measure to the nearest corner, and then draw on the paper a line of corresponding length. Measure the next side and draw the next line at right angles to the first. Keep on in this way till the starting point is reached. If the last angle does not come out a right angle, some mistake has been made.

If the room has not all its corners right angles, as for instance the one

shown in Fig. 1, then instead of measuring the line A C, the dotted lines A B and B C must be drawn on the floor, taking care that B is a right angle. These are laid down on the map in light pencil lines, and then

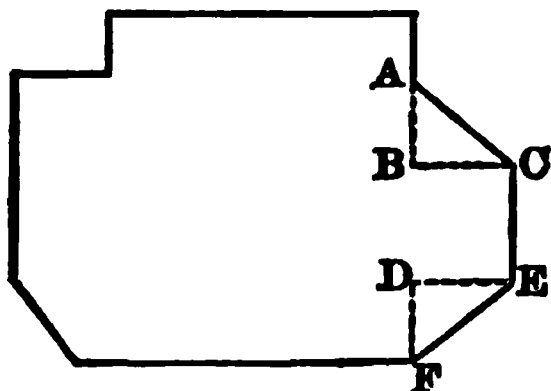


FIG. 1.

the points A and C are joined, after which A B and B C can be rubbed out. D E and D F are used in like manner. The lines can be made on the floor with thread attached to pins, or by laying down sticks.

Some rooms have curved walls, as

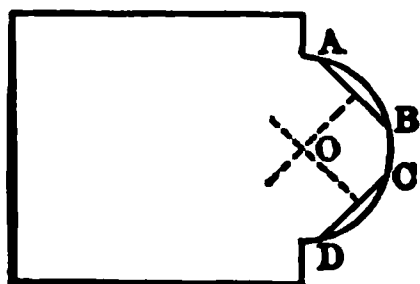


FIG. 2.

in Fig. 2. These curves are almost always parts of circles, and the first thing to do is to find the centre of the circle. This is done by taking any two points, A B, joining them by a line, finding the middle and then drawing there a line at right angles to it. The same is done with two other points C and D, and the point O, where the two lines meet, is the centre of the circle. By measuring the perpendicular distance of O from the nearest wall, its place may be found on the chart, and then by using a pair of compasses the circular part of the wall can easily be drawn.

To draw the plan of a whole house the same method is followed. In drawing the plan of a piece of ground in the same way, the plot, if irregular, should be inclosed as

nearly as possible by straight lines at right angles, and by parts of circles. When these have been

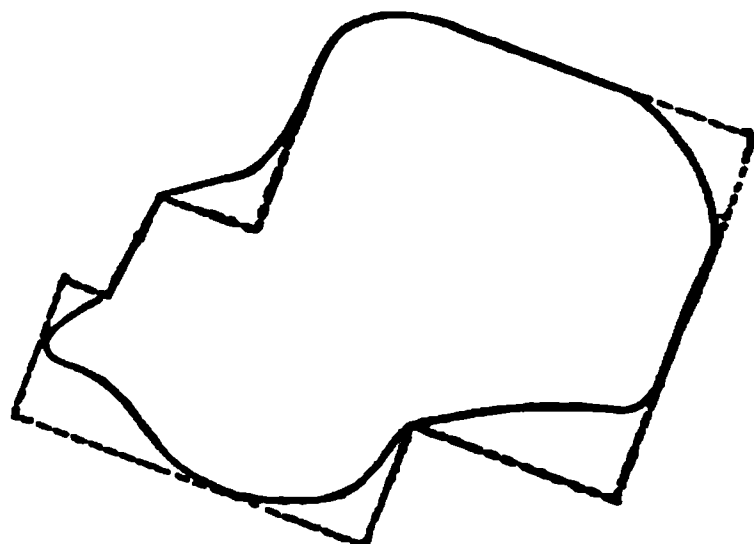


FIG. 3.

mapped, as in Fig. 3, the irregular lines may be drawn by the eye.

MARBLES. The manufacture of marbles is described in C. C. T. Many games are played with them, most of which are variations of those described below.

Ring Game. A ring is drawn on hard ground with a pointed stick, or on a pavement or floor with chalk, and each player places in it one or more marbles, as agreed beforehand. A line is drawn six or seven feet distant, and each player shoots a marble from it toward the ring, he who comes nearest to the centre being allowed the first turn. This is sometimes called "lagging." The players in turn now shoot at the marbles in the ring, trying to knock one or more of them out. As long as any one succeeds, he continues to play, shooting each time from the spot where his own marble rested after the previous shot. The marbles he strikes out of the ring become his property if the game is "for keeps," or "in earnest," but are given back to their former owners at the close, if the game is "for fun." When a player fails to strike any marbles out of the ring, he ceases to play, leaving his own marble where it lies. Any player may shoot at another's marble left thus outside the ring, instead of at those in the ring. A marble thus

hit is said to be "killed," and the player who kills it wins not only that marble but any that its owner has already won in the game. If a player's marble remain in the ring, it is "dead" also, and its owner must place back in the ring all the marbles he has won. The owner of a marble dead in either of these ways takes no further part in the game.

Marbles are often simply tossed by the hand, but the proper way of shooting is to flip them from the closed hand with the thumb. The



Manner of Shooting.

second, third, and little fingers are closed tightly, the thumb bent, its end being caught under the middle finger, and the forefinger, then bent over so that its tip touches the thumb. The marble is placed on the forefinger nail, and then by straightening the thumb it can be sent with great accuracy by a skilled player. Sometimes, when the marbles are simply rolled, instead of being shot thus, if an opponent cries "Knuckle down tight!" the marble must be shot properly, the knuckle of the forefinger touching the ground. The shooter is often allowed various privileges if he can claim them before his opponent forbids him. Thus, if he say "Roundings," he has the privilege of shooting from any point at the same distance from his mark. But if his opponent says "Fen roundings" first he cannot take the privilege. The word "fen" which is used in all similar cases, is thought to be a corruption of "defend," in the old sense of "forbid."

The form of the ring, the number of marbles placed in it, and the distance of the starting line vary in different places, and the game is

often given some fanciful name in allusion to the changed shape of the ring. Thus, forms of the game played in New York City are called "In the Fat," and "In the Soup."

Instead of starting from a straight line, or "offing," the players sometimes shoot from any part of an outer circle.

Fortifications, a kind of marbles originally played in France. The ground is marked out to represent a fort, and the players try to knock the marbles fairly outside the lines. Each may start from any outside line, and make his first shot at the marbles in the inside figure, called the "fortress." In other respects this is like the Ring Game.

Pyramid. Inside a ring about four feet in diameter are placed four marbles, three closely together and the fourth on top, forming a pyramid. Each player shoots from a spot previously agreed upon. Any one who hits the pyramid receives as many marbles as he can knock out of the ring. Any one who fails to hit it, gives a marble to one of the players, who has charge of the ring, and is called the banker. When all the marbles are gone from the ring, another player becomes banker. The banker must furnish the four marbles which form the pyramid at the opening of each game.

Bridge. This is played with a board, through which are cut several arches, each of which has a number over it. The players take turns in serving as banker, as in the last game. Each player gives the banker a marble before he shoots, and the banker pays him back a number of marbles equal to the number over the arch through which he shoots. If he does not shoot through an arch, the player gets nothing, and if he misses the bridge altogether, he gives the banker another marble.

Three Holes, a marble game based on somewhat the same prin-

ciples as GOLF. It is played in many ways, but in all three little holes are made in a row, each about two inches across and one inch deep. They may be three or four feet apart, or more, if the players are skilful. An "offing," or starting-line, is drawn about a yard from the first hole. The players in turn shoot from this line at the first hole, and when any one has lodged his marble in it, he shoots from that hole either at the second or at the marble of any other player. Each marble remains where it stops, till the owner's next turn. Any one whose marble is struck is put out of the game. When the second hole is made, the third hole is shot at from the second, and he who first gets his marble into it wins the game, and takes all the remaining marbles. But a game may be won also by a player who has gained only one hole, by striking his opponents and putting them all out.

Sometimes, when a player has gained the first hole, he can make the others, in turn, place their marbles in front of that hole and shoot at them from the starting-line. If he hit, the owner of the marble he hits is out of the game, and the next in turn puts up his to be fired at. But as soon as the player misses one of the marbles, his turn comes to an end.

Sometimes the player is required to make the three holes, one after another, nine times, before he wins, but he is allowed to shoot from as great a distance from each hole as he can measure by stretching out his hand, from little finger to thumb. This is called "taking a span."

Battle Game, an in-door game of marbles played by two persons with equal numbers of marbles, representing the soldiers. Players sit on the floor, on opposite sides of the room, so that the seams of the carpet or joints in the floor run from right to left. Each player places his marbles as he pleases on his own

side of the seam, or line nearest the middle between that and the next seam toward him, which is called his "dead line." One marble is used by both players to shoot with, alternately, and the object of each is to knock his opponent's men beyond their dead-line. Any man driven beyond this line, either directly by the shooter, or by one of his fellow soldiers, is dead; and he who first "kills" all his opponent's men is the winner. The hand must not be advanced beyond the dead-line in shooting. If a player hit one of his own men by accident, driving him beyond the middle line, such man becomes a prisoner, and may be placed by the opponent as one of his own.

MATCHES, Experiment with. Place two matches in the end of a small pasteboard match-box, as shown in the illustration, and a third

Experiment with a Match-box.

between them. Light the third one in the middle, and then ask the company to guess which of the upright matches will take fire first. All guesses will be wrong. Neither of the upright matches will take fire, for when the lighted match has burned through, the others, acting

as springs, will break it in two and throw it aside to some distance, putting it out. This experiment resembles that of the **TOOTHPICK COMB**.

MAY-DAY SPORTS. The chief sport for May-day (the 1st. of May) is dancing around the May-pole. A pole, decorated with flowers, may be set up on any lawn, but in the Northern States, where May-day is often cold and cheerless, a smaller pole may be erected in the house, by fastening it to a box or frame, like a **CHRISTMAS-TREE**. An even number of colored ribbons may be tied to the top, each being held at the end by a child. Half of them hold the ribbons in their right hands and the rest in their left. All move forward, half going in one direction and half in the other. First those going to the right pass under the ribbons, and then those going to the left, so that finally the ribbons are woven around the pole.

At a May-day party, one of the girls should be chosen Queen of the May, and should then be given control of all the games. She may select any number of maids of honor to assist her.

May-Baskets, little baskets of flowers hung upon the door-knobs of friends by children in New England. This must be done silently, for it is considered a disgrace to be caught.

History. May-games have been common from the earliest times. The ancient Romans celebrated a festival of the kind called *Floralia*, in honor of Flora, the goddess of flowers. In England the Druids were accustomed to light bonfires on the hills on May-day to welcome the spring. On the eve of the day the young men of each village, both in England and on the Continent, went to the woods and cut a May-pole, which was decorated and set up in some open place, and on the following day all the people danced about it. Many of our singing

games are thought to be derived from this dance about the May-pole. It was also customary to choose the prettiest maiden of the village as queen of the May. Early on May-day morning young men brought bouquets or boughs laden with blossoms, and placed them at some girl's door or under her window. These were called in England May-busquets (bushes), of which our word May-baskets is probably a corruption. May games were forbidden in England in Puritan times, but many of the customs connected with them survived and were brought to this country by the earliest settlers. They are not observed to-day as much as they were fifty years ago, but in New England the hanging of May-baskets is still common, and May-poles are now and then put up in various parts of the country. Many are to be seen in Central Park, New York, every May-day, set up by the school-children, who march thither with them in procession through the streets. In some parts of France a procession of young girls, dressed in white, is formed on May-day. At their head is the prettiest, with a white veil, a crown of flowers, and a candle in her hand. They go from door to door, singing and asking from every one a contribution for the adornment of the church altar. Similar processions are also to be seen in other European countries. In Cornwall, England, a miniature ship, decorated with flowers, is borne about.

MELTING ICE, Experiments on,
1. Put lumps of ice into a pail of water, and, after stirring for a time, take the temperature of the water with a thermometer. It will be found to be at the freezing point. Put the pail over a fire, and continually stir the contents. Before the ice has melted, test the temperature again, and it will be found still at the freezing point. The reason is, that all the heat of the fire

goes to melt the ice, and does not begin to make the water hotter till all the ice is melted.

2. Mix warm and cold water together till it has exactly the temperature of 176° Fahrenheit. Weigh a lump of ice, and put exactly the same weight of the water into a pail. Crack the ice into small bits and put it into the water. When it is all melted the water will be at the freezing point. The experiment will not succeed exactly unless the pail is a bad conductor of heat, for otherwise the heat of the room will affect the water. A good plan is to arrange the pail as described in CONDUCTION OF HEAT.

MENAGERIE, a game played by any number of persons, each of whom has a full pack of cards and takes the name of an animal, reptile or bird. Each player shuffles his pack and then places it face downward before him. The first player, (who is selected in any way the company choose) then takes his top card and places it, face upward, where all may see it. Each in turn, toward the left, does the same, and on the second and succeeding rounds the card that each turns is placed on the first, forming a second pile of cards for each player. When any one turns over a card that is the same as any other on the table that he can see, he must call out the assumed name of its owner, and its owner must call out his assumed name. Whichever does so first must give the other all of his cards that are face-upward. He who first gets rid of all his cards wins, but the game may be continued till one of the players is left with all the cards on the table. Instead of names of animals, any others may be chosen that the company agree upon, and if they are long and hard to remember, the game is more amusing.

RULES OF THE GAME.

1. In turning the cards, each player must turn the face from him and not toward him.

2. Any dispute, as to which player speaks first, shall be decided by vote of the players.

3. When a player has turned over the last card of his pile, so that all his cards are face upward, he must turn the pack face downward and proceed as before.

MENAGERIE, a trick in the form of a game. Those who have played the game before are taken into another room to represent the menagerie, while those who are ignorant of it remain as spectators. One of the former, chosen as exhibitor, calls the spectators, one by one, into the exhibition room, asking each as he does so what animal he prefers to see first. The spectator is led up to what looks like a cage, but when a cloth is removed he finds himself looking at his own face in a mirror. Each spectator remains in the exhibition room to laugh at those who follow. The cage can be made of chairs covered with a table-cloth or shawl, and the mirror should be placed at one end so that it looks, when properly draped, like a sort of window.

Another way to play the game is to arrange a box about two feet square, and from four to six feet long, open at both ends, but having a sliding door in the middle. The whole is draped with cloth. Two spectators are admitted at a time, and after each has told what animal he wishes to see, one is told to look in at one end of the den and the other at the other. The sliding door is then raised and each finds himself gazing into the other's face. When no box has been prepared, a piano, arranged as for a KALEIDOSCOPE, may be used instead, the sliding door being dispensed with; but in this case it must be arranged to have the two spectators look into the den at exactly the same time or the trick will fail.

MENTAL PHOTOGRAPHS, a game played by any number of persons with pencil and paper. A list of questions is first agreed upon as to

the likes and dislikes of the person addressed, such as "What is your favorite color?" "Who is your favorite historical character?" and so on. One of the players, who acts as leader, then reads the questions aloud, one by one, and the others answer them on paper, numbering the replies to correspond with the questions. The papers containing the answers are then given to the leader, who reads one at a time in connection with the questions. The players try to guess, from the kind of answers given, who the writer is. Of course the writer must try to answer the questions honestly, or else there will be no use in guessing from the answers who he is. Sometimes "Mental Photograph Albums," with printed questions, are kept by people who wish to record thus the feelings of their friends. Such albums were very popular at one time.

The questions should be agreed upon by the company, and varied to suit the tastes or ages of the players. A sample-list is given below:

1. What virtue do you most admire?
2. What vice do you most abhor?
3. Who is your favorite prose author?
4. Who is your favorite poet?
5. What is your favorite novel?
6. What is your favorite game?
7. In what are you most extravagant?
8. How do you prefer to save money?
9. What do you think the pleasantest season?
10. What is your favorite picture?
11. What is your favorite statue?
12. What is your favorite flower?
13. What is your aim in life?
14. What is the sweetest word?
15. What is the saddest?
16. What is your favorite man's name?
17. What is your favorite woman's name?
18. What is your greatest fault?
19. What do you most desire?

Another way of playing the game

is to have several written or printed sets of answers to questions such as those given above. These sets are numbered, and are held by the one who asks the questions. Each player in answer to one of the queries gives a number at random, and the leader then reads the corresponding reply. This form of game is called in Germany *Die Beichte* (The Confession).

MERCHANTS, THE, a game in which the players personate merchants, and each guesses, from his country and the initial letter of the article, what his neighbor has for sale. The players being seated in line, the one at the end begins, for instance: "I am an English merchant, and I sell C—." The next in line must supply the article, which may be carpets, china, cheese, clothing, or any production of England, but must be nothing not made or grown there, like coffee or cinnamon. Any one who violates this rule must pay a forfeit, and his turn passes to the next. Whoever names a correct article then announces in like manner his own country and the first letter of what he sells, and the game goes on thus, as long as the players choose. It should be played rapidly.

MERCURY-BUBBLES. Pour into a large tumbler a layer of mercury about half an inch thick, and place it under a water faucet, from which

water issues at high pressure. The glass first fills, and then little balls of mercury are seen floating about in it. These balls are bubbles of mercury, filled with water, which has been carried down by

Mercury Bubbles.

the force of the jet, and float in the water as soap-bubbles do in air. For the success of the experiment it is

necessary that the water should issue from the faucet with force enough to carry it down to the mercury through the water in the tumbler.

Bubbles can also be blown on the surface of mercury under water by blowing through a glass tube filled with water, whose end is just under the mercury surface.

MERCURY FOUNTAIN. Provide a bottle with a rubber stopper having two holes (see **CHEMICAL EXPERIMENTS**). Through one of the holes pass a glass tube bent into U shape at its lower end, and through the other a glass tube having its upper end drawn out to a jet. Fill the bottle with water, and, placing the finger over the jet, pour mercury into the other tube. When the finger is removed, the weight of the mercury will force the water out of the jet in a stream. Six inches of mercury in the tube will raise the water to a height of several feet.

MERELLES. See **NINE MEN'S MORRIS**.

MESMERISM, a trick in which one person pretends to mesmerize another. The one to be mesmerized, called the "subject," who must be unacquainted with the trick, is told to sit opposite the operator, who calls for two soup-plates filled with water. By previous arrangement, the bottom of one has been blackened by holding it over a candle, and this one is given to the subject. The latter is directed to fix his eyes steadily on the operator's face, and to imitate every motion as exactly as possible. The operator then dips his finger in the water in his plate, rubs it on the bottom, and then draws a line on his face. The subject does the same, except that as the bottom of his plate is blackened, he thus makes a black mark on his face. As his eyes are fixed on the operator's face, he does not perceive that his fingertip is black. When the operator has thus caused him to decorate

his face as much as he chooses, he tells the subject that his will must be very strong, as he finds it impossible to place him under the mesmeric influence. The subject may then be shown his face in a mirror.

A variation of this trick is called in France *Le Singe* (The Monkey). The one who represents the monkey sits opposite another person and each is given a hat but the monkey's hat has been previously blackened on top. The monkey is told, as in the trick just described, that he must imitate all the motions of the one opposite, who from time to time rubs his face with his hat. In this trick there is no pretense of mesmerism, but the victim is told that the motions he is required to imitate are very difficult, and that he who succeeds in doing so perfectly will win the game.

MICROPHONE, a device for making very low sounds audible at a distance. A simple one can be made by any one who possesses an **ELECTRIC BATTERY** and a telephone.

Cut off two pieces of lead-pencil in which the lead is as large as possible, one two inches long and the other half an inch. Sharpen the first at both ends, and split the other lengthwise, so that half the lead will be in each piece. Make a little pit with a sharp knife in each lead, stick the short pieces of pencil in holes in a board two inches apart, and support the long piece between them, each of its points resting in one of the little pits; insert a copper wire in each of the holes from the opposite sides, so that each may be in contact with one of the short leads. One of these wires leads to one pole of the battery, and the other, after passing through a telephone, to the other pole. The board bearing the pencils is fastened upright. If now the telephone be held to the ear while some one scratches the board bearing the pencils, the scratch will be plainly heard in the telephone. In like manner other

slight noises will be reproduced, such as the ticking of a watch held against the board. In delicate forms of the instrument the footsteps of a fly

walking across the board can be heard. The microphone will work better if, instead of lead-pencil, pieces of gas carbon be arranged

Microphone.

in the same way. Gas carbon can be obtained at gas-works, or of a dealer in electrical supplies, as it is used in electric lights.

The reason why the sound is magnified in the telephone is this: The "lead" in a pencil (which is really not lead at all, but graphite), is a substance whose resistance to the electric current varies greatly with pressure. Scratching on the board, or making any other slight noise, joggles the pieces of lead-pencil. They push against each other, their resistance is altered, and hence the current passing through the telephone varies. Now, a variable current in a telephone produces a sound (see C. C. T., TELEPHONE) hence the noise made on the board is reproduced.

The word microphone is from the Greek *micros*, small, and *phonein*, to hear.

MILK-LAMP, THE. Admit a single ray of light into a darkened room, as explained under PRISM, and with a mirror reflect the beam down into a tumbler of water with which a few teaspoonfuls of milk have been mixed. The milk will shine with a brilliant white light, lighting the whole room.

MIND-READING, a game played by any number of persons, one of whom leaves the room, while the others agree on some simple thing for him to do. The player

without is then called in, and one of the company takes him by the hand, at the same time thinking intently of the thing agreed upon. He must not move unless the first player moves. The player who went out must keep his mind quiet, trying to think of nothing in particular, moving in any direction he feels impelled to move, and doing whatever he feels impelled to do. The player will often do the very thing which he was required by the company to do.

People are not agreed as to the reason for this. Some think that the player's mind is really influenced by that of the one who holds his hand, others that success is reached by mere chance, and others still that the player who has his mind fixed on the required act thinks of it so strongly that he cannot help showing the other, by unconscious muscular movements, what is to be done. It is generally found that certain players succeed better when they are leaders, and others when they are led. Instead of merely taking hands, the player who goes out often holds the back of the other's hand against his forehead. Sometimes the one who goes out holds no one's hand at all, but the entire company think very earnestly of what they have agreed he shall do.

Exhibitions of mind-reading are sometimes given in public by men

who make it a business, and they do many wonderful things; but in such cases it is hard to tell whether the performers are honest in what they do, or deceive the spectators by some trick. A society has been formed in England to investigate mind-reading and similar things scientifically, and its reports say that it has discovered people who are remarkable mind-readers. For instance, it is claimed that one person was able to tell the taste of different substances placed in another person's mouth, and to draw figures thought of by other people. There are still many people, however, who think that there is no such thing as mind-reading, and that these results were produced by chance or deception. However this may be, mind-reading, when played as a game, as just described, furnishes much amusement. The tasks agreed upon should be very simple at first. For instance, the player may be required to go and stand before some article or person in the room. When some one is found who seems to be able to do this well, the difficulty may be increased; thus he may be required to walk up to any object and lift it, to a chair and sit in it, or to a person and shake hands with him.

MIRRORS, Experiments with. Some of the properties of mirrors are described in C. C. T., in the article on LIGHT.

1. Stand between two mirrors which face each other directly. A long line of images of yourself will be seen, the farthest ones vanishing in the distance. If a candle or other bright object be held in the hand, the number of images which can be traced is much larger.

2. Place two small mirrors edge to edge, and open and shut them, like the leaves of a book, the reflecting sides being within. Place between them a lighted candle, or some other bright object, and its images will increase in number as

the mirrors shut together, and lessen as they open. (See KALEIDOSCOPE.)

3. In a dark room hold the hollow side of a bright silver table-spoon, forming a concave mirror, before the face and a candle-flame between the spoon and your eyes. A small image of the flame, upside down, will be seen about half an inch in front of the spoon. Hold the back of the spoon toward you, forming a convex mirror, and a small erect image of the flame will appear behind it.

4. Paint the outside of an argand lamp chimney black, and look through it, toward the light, at a pin-hole in a piece of cardboard. It will appear as several circles of light.

5. Hold a glass of water above the eyes, and look up into it through one of the sides. The reflection of objects below will be seen in the under side of the water surface.

6. Cut out a letter or design from thick paper and paste it on a small mirror. If letters are used they must be turned wrong side out, as they appear when viewed in a looking-glass. If the mirror be held in sunlight so as to reflect a beam on a shaded wall, the letter or design will appear there in black on a light ground.

MISS JENNIA JONES, a singing game played by any number of children. The following is one of many similar versions: A girl represents Miss Jennia Jones, and another her mother. Miss Jones stands behind her mother's chair or sits in her lap. The other players form a ring around the two, and one by one advance and sing a verse, the mother answering in like manner. The tune is the same as in the "Barberry Bush." For instance:

"I've come to see Miss Jennia Jones,
Miss Jennia Jones, Miss Jennia Jones,
I've come to see Miss Jennia Jones
And how is she to-day?"

"She's up-stairs washing,
Washing, washing,
She's up-stairs washing,
You can't see her to-day."

Each player asks the same question, and the mother returns the same answer, substituting in each case a different occupation, as "cooking," "ironing," or "baking." At last she is said to be "sick," then "worse," and then "dead," when the players sing all together,

"What shall we dress her in,
Dress her in, dress her in,
What shall we dress her in,
Shall it be blue?"

"Blue is for sailors,
Sailors, sailors,
Blue is for sailors,
So that will never do."

Various other colors are then suggested, and each is rejected in like manner, till white is mentioned, which is accepted.

Miss Jones is then buried, after which the players sing:

"I dreamt I saw a ghost last night
Under the apple-tree."

Miss Jones jumps up, the players run in all directions, and she tries to catch one, who must represent Jennia Jones in the next game.

History. This game has been long played in the Middle States. A similar Scotch game has for the name of the heroine Jenny Jo (Jenny Joy, or Sweetheart) so "Jennia Jones" is probably a corruption of "Jenny, my Jo." The game seems to be derived from an old love ballad, where the heroine dies of a broken heart. The reasons given for rejecting the different colors vary with the locality. Thus red is sometimes said to be "for joy," and sometimes "for firemen." Yellow may be "for glad folks," or "for Orangemen," and so on.

MIXTURE OF LIQUIDS, Experiments on: 1. Put in a bottle equal quantities of mercury, sand, water, and olive oil. When the bottle is shaken they will form a turbid mixture; but when it is allowed to stand a few moments, they will sep-

arate into four distinct layers, the mercury at the bottom, the sand next, the water next, and the oil at the top. They will remain thus, no matter how long the bottle is kept. This arrangement is sometimes called the "phial of the four elements," the mercury representing fire, the sand earth, the water water, and the oil air.

This experiment may be varied as follows: Use as liquids mercury, solutions of white and blue vitriol, (sulphates of zinc and copper) water, and alcohol. Have ready a leaden bullet, two balls of wax weighted with shot so that they will just float respectively in the white and blue vitriol, and a cork weighted so that it will sink in alcohol but float in water. Place these four in the bottom of a tall jar and pour in the liquids in the order given above. All the balls will rise when the mercury is poured in, and one will be left behind with each of the other liquids, so that the balls will be distributed throughout the jar at the close. If the lightest liquids are poured in first, one ball will rise as each is introduced. In this case each must be poured in through a glass tube, so that it will not mix with the others. When the glass tube is pulled out, it should be held an instant in each liquid, so that currents will not be formed. The liquids used in this case, all but the mercury, will mix with each other if stirred, so the phial cannot be shaken.

2. Fill a glass half full of water, and then make a strong solution of blue vitriol in about a quarter of a glass of water. Put a funnel in the glass of clear water, the end resting on the bottom, as in the figure, and pour into it quietly and slowly the solution of blue vitriol. Being slightly heavier than pure water, it will remain at the bottom of the glass if it is kept still, and by holding it up to the light the line between the blue liquid and the

water will be seen to be quite sharp. Let the liquids stand in a still place for a week or more. In a few days the line between the two liquids will become blurred, and after a time they will be completely mixed, the

blue liquid, though heavier, having crept up into the water. This is because the particles of liquids are in continual motion, even when they seem to us to be still. The result of this motion is called diffusion.

3. Color some bi-sulphide of carbon with iodine and pour a few drops into a test-tube, or bottle half full of water. The colored liquid will sink to the bottom. Leave the bottle alone for a long time, and, though the liquids do not seem to mix, the bi-sulphide grows less, and finally disappears entirely. The odor near the bottle shows that it has evaporated, though it was under water.

4. Make some "vegetable parchment," as described in Experiment 4, under SULPHURIC ACID, and tie it tightly over the large end of an argand lamp chimney, so that it will hold water. Cut about two thirds from the small end (see CHEMICAL EXPERIMENTS, directions for Glass-working) and fit it with a stopper or cork in which is a glass tube. Fill the vessel thus formed with a solution of blue vitriol, and press down the cork so that the liquid will rise slightly in the tube. Suspend the chimney parchment end downward,

in a glass of water. In an hour or two it will be seen that the liquid has risen in the tube. The two liquids have been mixing through the parchment, but the water, since it is lighter, has come in faster than the blue vitriol has gone out, so there is more liquid in the vessel than there was at first. The mixing of liquids through porous partitions is called Osmose, from a Greek word meaning "impulse."

MONETA, a game played by any number of persons with a pack of fifty cards, on which are pictures of coins of the United States. There are five each of the one-cent, two-cent, three-cent, five-cent, ten-cent, twenty-cent, twenty-five cent, and fifty-cent pieces, five silver dollars, and one each of the gold dollar, quarter eagle, three-dollar piece, half-eagle and eagle. Four cards are dealt to each player, and four are placed face upward on the table, forming the Bank. Beginning at the dealer's left, each in turn may exchange one card at a time for two or more of the same value in the Bank. Thus, a quarter-dollar may be exchanged for two dimes, a three-cent piece, and two cents. The cards thus taken from the Bank are placed by themselves to form what is called the player's Safety Fund. Any player, if he can take nothing, may "build" as in the game of CASINO. That is, he may place a piece of money on another, or others from his hand, in the Bank, saying "I build," provided he can take them at his next turn. Any succeeding player may take the pile if he can, or add to the build, but the pieces cannot be taken separately. If a player can neither take nor build, he must place a card with the others in the Bank. Four more cards are given to each player by the dealer whenever they are needed. When all the cards have been used, if any remain in the Bank, the taker of the last card chooses one, the player at his left another, and

so on till all are gone. Each player scores the money value of the cards in his Safety Fund, and, in addition, ten cents for each card. Since each card counts thus in addition to its face value, as many cards as possible should be taken; thus, it is better to exchange a dollar for four quarters than for two half-dollars.

MOON, Observations on the. The moon is described in C. C. T. The curious things on its surface may be seen by any one who has a common opera-glass. The best time to look at the moon is not when it is full, as people are apt to suppose, but when it is waxing or waning. The part to look at is the line that divides the bright from the dark surface. At this line, it is sunrise on the moon when it is waxing, and sunset when it is waning. Near it the shadows are longer and more noticeable, just as they are on the earth at sunrise or sunset. The outlines of the lunar mountains can thus be seen much more plainly than when the sun is shining down full upon them, as it is at full moon. By watching carefully, the shadows can be seen to change as the line of sunrise or sunset moves slowly over the moon's surface. The principal things to be noticed on the bright surface of the moon are the dark patches, which were formerly thought to be seas, and the bright streaks that run over the surface; but with an opera-glass these are not nearly so interesting to watch as sunrise and sunset on the lunar mountains.

MURIATIC ACID, Experiments with. See HYDROCHLORIC ACID.

MORA, or MORRA, A game played by any number of persons, who hold up fingers and guess at the total number. A leader is appointed, who counts three, or makes some other signal, and at that instant each holds up as many fingers as he chooses and shouts out his guess. He whose guess comes nearest to the total number of fingers held up,

gains a point, and he whose points soonest amount to a number previously agreed on, wins the game. Every one must make his guess and hold up his fingers at the signal, if he holds up any fingers at all; but any one may guess and hold up no fingers. No one must change the number held up, and each must keep his hand raised till the leader can count the fingers.

Mora is a very ancient game, and is played in all parts of the world, generally by only two persons. The Romans called it *Digitis Micare* (flashing or snapping with the fingers), and the Italian name of *Mora*, or *Morra*, is said by some to be derived from *Micatura*, another form of the Roman title. The French call it *Mourre*.

The game is a great favorite in China. In the Friendly Islands a kind of Mora is played called *Liagi*. The players sit opposite each other, and make signs with the hands at the same time. The player whose turn it is holds up either his open hand, his closed hand, or his forefinger. His opponent does likewise, and if he chance to make the same sign, it becomes his turn, and neither gains. But if the first player can make one or other of the signs five times in succession without his opponent's doing the same, he scores a point. Five points win the game, and the score is kept by throwing down little sticks held in the left hand.

MOSAIC, a writing game played by any number of persons. Each writes a word on a slip of paper, and after the slips are mixed, one of the players draws and reads them one by one. Each writes them down in the order in which they are read, and must then write a story containing the words in that order. The game may be made more difficult by requiring the story to be within a specified length, or written within a certain time; and it may be made easier by allowing the players to in-

roduce the words in any order they please.

MRS. JARLEY'S WAX-WORKS, a theatrical entertainment suggested by the character of Mrs. Jarley and her wax-works, in Charles Dickens's story of "The Old Curiosity Shop." One of the performers, dressed like an old woman, takes the part of Mrs. Jarley, a little girl represents Little Nell, and two boys act as attendants. The rest of the performers represent wax figures, arranged singly, or in groups. When Mrs. Jarley wishes to exhibit a figure, she calls on the attendants to bring it forward. They stand, one on each side of the figure, double up its arms at the elbow, and then each, placing his hands under one of the figure's elbows, carry it to the front of the stage. The figure must hold its elbows stiffly at its side, but after reaching the front, the arms are straightened out by the attendants. After giving a comical description of the figure, in which Little Nell aids by pointing to the various features with her wand, as each is mentioned, Mrs. Jarley orders one of the attendants to wind it up, which he pretends to do, with a large imitation key. At the same time a person behind the scenes turns a watchman's rattle, to imitate the sound of winding. The figure then goes through movements, practised beforehand, and then is set back in its place, as before, by the attendants. The motions of each figure must be appropriate to the character it is supposed to represent. They should be simple, and performed in a series of stiff jerks, as if worked by badly-oiled machinery. The face should be immovable, and the carriage stiff and awkward. The motion should grow slower toward the end, as if the machinery were running down, and should stop with a jerk in the midst of a movement. The attendants should then bend the arms or body back into the original position.

The attendants may have dust-brushes, and carefully dust the figures before bringing them forward. It adds to the amusement if a careless attendant overturn one of the figures. The figure should fall stiffly forward, putting out his hands just before he reaches the ground. This requires practice, but if well done is very effective. The attendants then try to lift him, one at the head and one at the feet, when he bends at the waist, and has to be straightened out again. With a little ingenuity, many laughable variations may be introduced. The figures should practise their motions until they are perfectly familiar, and they should also hear Mrs. Jarley's account of them several times before the performance, otherwise some of the jokes, being unexpected, may cause them to lose their gravity.

The stage should not be crowded with figures, and if there are more than can be ranged around it at once, there should be more than one scene. There may thus be shown a "Historical Chamber," a "Chamber of Horrors," a "Shakespeare Chamber," and so on, at the pleasure of the performers.

MUGGINS, or SMUT, a game played by any number of persons, usually not more than six, with a full pack of CARDS. The cards are dealt, one by one, and each player places his, face downward, in a pile before him, without looking at them. Beginning at the dealer's left, each one in order then turns up a card, and places it face upward, forming a second pile for each player, as the game goes on. When an Ace is turned up, it is placed in the middle, and on each Ace the other cards of its suit must be placed in order, as they appear, ending with the King. Any card that cannot be placed on one of the middle piles can be put on any other visible card on the table that is just above it or just below it in value, without regard to suit; thus, if a Ten is turned

up, and there is no Nine on the top of any of the middle piles, it may be placed on a Nine or a Knave on top of any player's pile. So long as a player can thus dispose of his cards, he can continue to turn up; but when he cannot do so, the turn passes to the next. Each player's object is to get rid of all his cards, and the one who does so first, wins, if he can sit till the end of the game without being "mugginsed." A person is said to be "mugginsed" if he breaks any of the rules of the game, when the players cry "Muggins," and each gives him a card. The rules are very strict, and should be studied carefully. They may be changed, or new ones may be added at the pleasure of the players. Much of the fun of the game consists in watching for some player to break one of the rules.

RULES OF THE GAME.

1. No one must touch the table, or his cards, except when playing.

2. Each player, in turning a card, must take it with both hands by the corners farthest from him, and turn it face outward.

3. As long as he can dispose of his card by placing it in the middle, or on some other player's pile, he may continue to play; but when he can no longer do so, he must place his card on the one of his piles which is face upward, and say "Stop;" but if a player is mugginsed, his play ends at once.

4. A player may not be mugginsed for not saying "Stop," till the next one has begun to play.

5. Before a player turns his card he must look at the top card of his face-upward pile, and see whether that can be disposed of. If it can, he must place it, and then look at the one under it, and so on; and in no case may a card be turned over before this is done.

[For instance, suppose A has on top of his face-upward pile a Knave; and under it a Nine. B's pile shows

a Knave on the top. A looks first at his own Knave, and, seeing that it cannot be played, turns up a card, which proves to be a Queen. He places this on B's Knave, and must then place on it his own Knave before turning another card. The Nine which is thus exposed cannot be played, so he turns up another card, which we will suppose to be a Ten. He places this on B's Knave, and then puts on his nine before turning again. If he turns up a card that cannot be played, he must lay it down, saying "Stop."]

6. If a card can be played either in the middle of the table or on a player's pile, it must go in the middle; and if it can be put on any one of two or more players' piles, it must go on the one that is first met in moving to the left around the table.

7. When a player's cards are all face upwards, he must turn the pile over (saying "Flop" as he does so) and begin again.

8. When a player comes to his last card he must, before playing it, turn it over three times in the air, saying "Muggins" each time, then blow it thrice and snap it once. When it has been played, he must not utter a sound during the rest of the game. If he does, he is "mugginsed," receives a card from each player, and enters the game again. The other players may do what they choose (without touching him) to make him speak or laugh aloud.

9. In giving a card to a "mugginsed" player, each shall draw such card from the bottom of his back-upward pile, and the mugginsed player shall place them under his own pile.

The game is sometimes called Smut, from the old custom of blackening the face of the last player to get rid of his cards.

MULBERRY BUSH. See **BARBERRY RUSH.**

MUMBLE THE PEG (corrupted into Mumbledypeg), the name of

two different games. I. An outdoor game played by a number of players usually not exceeding four, each with a stick of wood about eighteen inches long and two or three inches thick, pointed at one end, called a peg. Each player, in an order which is decided before the game begins, throws his peg so that it may stick in the ground. He has but one throw at a time, whether he succeeds or not, and in either case his peg remains where it sticks, or lies, till his next turn. Any player, in making his throw, may try, in doing so, to knock the peg of another player out of the ground, or to move any peg that is lying on the ground. If he succeed in doing either of these, and at the same time put his own peg into the ground, he must knock the peg so overturned or moved as far as he can with his own peg, and then try to stick his own peg into the ground three times before the owner of the other can do so once. If he succeed, the owner of the other peg is out of the game; if not, that owner holds his peg in his hand till his next turn. The game goes on till only one player is left, who is the winner.

RULES OF THE GAME.

1. A peg shall be judged to be in the ground when any other peg can be placed under it without touching it.

2. When a peg is thrown, it shall touch no other before leaving the player's hand. This game is very old. The Greeks played it, calling it *Kandalimos*. In England it is known as *Loggats*; in France as *Riding to Rome*, and in Germany each locality has a different name for it. The Swiss call it *Hornig-geln* (probably The HornYell), the Austrians *Schmerpecken* (probably Greasy Sticks), the Suabians *Stöckles* (Little Sticks), and the Bavarians *Pickeln* (Picking).

A game somewhat like it is played on horseback by the Turcomans and

other tribes, in Central Asia and India. The Oriental name is *Neze Baze*, and the English call it *Tent Pegging*. A peg like those used in fastening tents is driven into the ground, and the players in order try to knock it out with their lances as they ride past.

II. A game played by any number of persons, each with a pocket-knife, one of whose blades is open. Each player, in turn, tries to throw his knife so that it will stick in the ground or the floor. Any one who does not succeed in three trials is out of the game. Any knife shall be judged to be in the ground when the handle of another knife may be held under it without touching it. When all have tried, holding the knife in one way, another way is tried, and so on, till only one player is left, who is the winner. The ways of throwing the knife, and the order in which they come, are different in different places. The following order, or something like it, is common:

1. The knife is held by the handle and thrown as in Fig. 1.

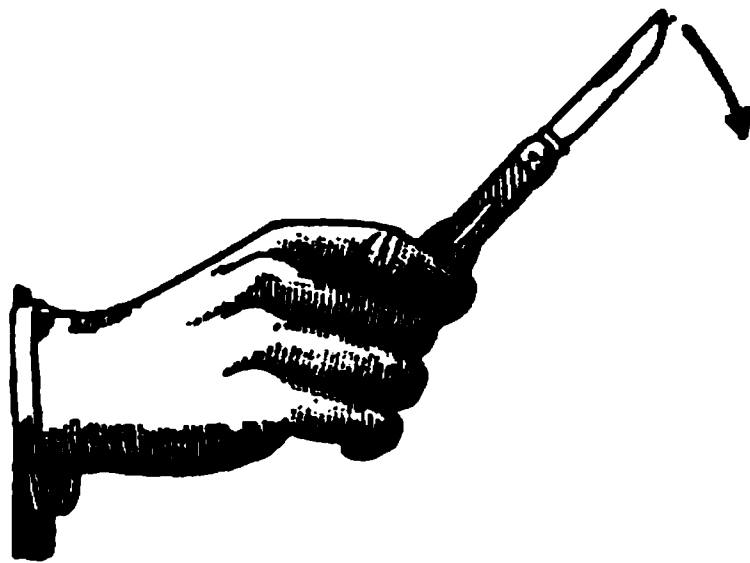


Fig. 1.

2. The same, holding the knife by the blade.

3 and 4. The same, with the left hand.

5, 6, 7, and 8. The four preceding, making the knife turn a complete somersault before striking the ground.

9. The knife is laid lengthwise on

the palm of the right hand, with the blade pointing outward.

10. Same, with the blade inward.

11 and 12. Same, with knife held across the palm, the blade pointing first to the right and then to the left.

13-16. The four preceding, with the left hand.

17-24. The eight preceding, making the knife turn over before striking.

25. Place the point on the knee, and throw as shown in Fig. 2.

Fig. 2.

26. The same, with the handle on the knee.

27 and 28. The two preceding, with the left hand and knee.

These are all sometimes repeated with the blade at right angles with the handle.

These two games derive their names from the custom, still sometimes followed, of making the loser in each pull out with his teeth a small peg, which is so driven into the ground by the winner that the end is level with the surface.

MUSICAL, a SOLITAIRE game of CARDS, played with one full pack. An Ace, Two, Three, and Four of any suit are placed in a line, and under them, respectively, a Two, Four, Six, and Eight, thus:

1	2	3	4
2	4	6	8

In playing, any card may be placed on one of the lower line, if the number of the former's pips is the sum of those on the card it is placed on and the one just above; thus, a Three may be placed on the Two, or a Nine on the Six. The Knaves count as 11, the Queens as 12, and the Kings as 13. If the sum of the two cards exceeds 13, the excess only is counted; thus, Queen and Four, instead of being 16, counts only as 3. Any card that cannot be used is placed aside to form Stock, and the top card of the Stock can be used at any time. The Stock can be twice shuffled, and played again. To win, all the cards must be placed on the piles, when the top cards in the lower row will all be Kings. This game is entirely one of chance, and is not often played successfully. It is called Musical because the cards are laid out in two scales of numbers.

MUSICAL FRIGHT. See GOING TO JERUSALEM.

MUSICAL GLASSES. If the moistened finger be rubbed around the edge of a glass finger-bowl or an ordinary goblet of thin glass as in the illustration, a clear musical sound will be produced. This note is higher or lower according to the size of the finger-bowl and the amount of water in it. By choosing



Musical Goblet.

bowls of different sizes and pouring in water to different depths, it is possible to tune them to the notes of the musical scale, so that tunes can be played upon them. A set of glasses of the same size may even

be tuned thus simply by pouring different quantities of water into them. The glass sounds for some time after the finger has left; hence chords can be played by rubbing one after another. When the player wishes a note to cease, he touches with his finger the rim of the glass which is producing it.

MUSICAL NEIGHBORS, a game played by any number of persons, half of whom are blindfolded. The blindfolded players are seated in a row, alternate chairs being left empty. The others stand in the middle of the room till commanded by the leader to be seated, when they sit quietly in the empty chairs. The leader then gives the command "Sing," and plays some well-known air on the pianoforte. The unblindfolded players sing it together till the leader says "Silence," and then each of the blindfolded players is required to name his right-hand neighbor. Each who does so correctly changes places with the one whose name he guesses, who must submit to be blindfolded in turn. The unblindfolded players then stand in the middle of the room again, and the game is repeated as many times as the players please.

To make the game a success, all the players must begin to sing at the word of command. The voices may be disguised at pleasure. The game may be varied by allowing each to make whatever noise he pleases, instead of singing a song.

MY AUNT'S GARDEN. See REPEATING GAMES.

MY HOUSE, YOUR HOUSE, a game played by any number of persons sitting around a table, in the middle of which is a circle about five inches in diameter. The circle may be drawn with chalk, or made of paper. A slip-noose is made at one end of a cord about a yard long, and the other end is tied to a cane. One of the players holds the cane, and the slip-noose is laid around the chalk circle. When he says

"My House," each of the other players must touch the tip of his forefinger to the table inside the circle; and when he says "Your House," each must withdraw his finger and place it on the table in front of him. The commands "My House," "Your House," may be repeated as fast as the speaker pleases, and in any order he wishes. Any one who does not put his finger in the circle at the command "My House," or who takes it out except at the command "Your House," must pay a forfeit. When the player with the cane says "Your House," he is allowed to tighten the noose quickly, trying to catch any fingers that remain in the circle. If he succeeds, the person whose finger is caught must take his place, and the game goes on.

MY LADY QUEEN ANNE, a guessing game played by any number of persons, who sit in a circle. A ball is hidden about the dress of one of the players, and another, who stands within the circle, guesses where it is. First the players in the ring sing:

"My Lady Queen Anne, she sits in the sun,
As fair as a lily, as brown as a bun.
The King sends you three letters and bids
you read one."

The one in the middle answers:

"I cannot read one, unless I read all,
So pray you, — — —, deliver the ball."

If the person guessed have the ball, he changes places with the one in the centre, otherwise the game is repeated till a successful guess is made.

MY SHIP, a game played by any number of persons, some of whom have not taken part in it before. Each player is asked what his ship is laden with, and is expected to mention an article beginning with the first letter of either of his names. Thus if his name is John Smith, he may say, for instance, "Jews-harps," "Sunfish," "Jelly," or "Soup." Those who have not played before are not

told of this condition, and whenever they mention something beginning with the wrong letter, are told that the ship cannot enter port with such a cargo. They are usually much puzzled by observing that a cargo proper for one person is not allowable for another. This game is played under several different names. In one form, each is asked, "What will you take to the picnic," and if the answer does not begin with the proper letter, the player is told that he will not be allowed to go.

MYTHS, a guessing game played by any number of people. One player begins by asking a question of some other, relating to an historical or fabulous event he has in mind. The person addressed must reply in such a way that the questioner will know whether he has guessed it correctly or not. If correctly, the

questioner lets him know by a second remark, but without giving information to the other players. If incorrectly, the questioner must guess to what event the player thought he referred. If he cannot do so, he must tell the company what he had thought of, and the event thought of by the questioned player becomes the "myth." For instance, A says "How do you like shoes?" B answers "Made of Glass." A. "Not Cinderella." C. "When I want to catch a train, they are invaluable" (guessing correctly that A referred to Jack the Giant Killer's "shoes of swiftness"). A. "Then you should enter for a pedestrian contest" (thus letting C know that his guess is correct).

Whenever two players have guessed correctly, the subject must be told to all the others.

N

NAPOLEON. See **EUCHRE**.

NECKTIE PARTY, a young people's entertainment, at which each girl wears a colored apron, and provides a necktie also of the same material. The neckties are placed in a room by themselves, and each boy, as he enters, must choose one and put it on. The girl who wears the corresponding apron is under his special charge for the evening. He must see that she enjoys herself, take her in to supper, and see that she reaches home in safety. Of course, the same number of boys and girls should be invited.

NEEDLES, Experiment with. Having cut out a piece of cork somewhat like that in the illustration, thrust the point of a needle through one side, at A, and let its eye rest loosely on the other, at B. Stick the point of a second needle into the cork through the eye B of the first, and stick a third by the side of the second. Hold the middle of the first needle in the flame

of a candle, by means of the cork, and as it expands with the heat it will push the needle in its eye out

Experiment with Needles.

of the perpendicular, as will be seen by comparing it with the third

needle, which remains upright. On taking the cork away from the candle, the horizontal needle contracts, and the other becomes upright again.

NEGRO MINSTRELS. In such a performance, young people sometimes lose much by omitting details that at first may seem obvious or well known. In seating a minstrel troupe, do not do it in a straight line, but in a semi-circle with the ends towards the audience. Put the funny men at the ends, and in the middle put the "interrogator," or serious man, whose dignity is intended to make the others seem the funnier. Let the funny men ask their conundrums of him, and let him do no interrupting; the funny men must do all that. It's well for the interrogator to repeat each conundrum very distinctly. If "Bones" or "Sambo," asks in negro dialect, "Mr. Johnsing, why am you like de mudder of General Jawge Washington?" let the interrogator repeat very distinctly, "Why am I like the mother of General George Washington?" Unless this is done, the question of the conundrum is very apt to be lost amid the laughing and confusion of such a show. In some shows, the interrogator repeats the answer too.

Although the piano has no place in a minstrel show, there is no serious objection to playing it behind the scenes in connection with the music made before them.

NEWMARKET, or STOP, a game of cards, played by any number of persons with a full pack, from which the Eight of Diamonds has been removed, and with four additional cards, called the pool. The pool-cards, which are the Ace of Spades, King of Hearts, Queen of Clubs, and Knave of Diamonds, are laid face upward, by themselves. Before the deal, each player places counters agreed on on whichever of the pool-cards he pleases. Not all the pool-cards need have counters on them, and several players may place their counters on the same

card. The entire pack is dealt, one at a time, including an extra hand, which is placed face upward where all can see it. The eldest hand now leads, generally the lowest card he holds of any suit where he has the King, or if he has no King, of his longest suit, and he declares the card as he leads. (Ace ranks below the Two.) The holder of the next higher card must then play and name it, then the holder of the card above that, and so on till no one else can play. He who plays the last card, which is called a stop-card, takes the trick and leads for the next. The stop-cards are the four Kings, because there are none higher; the Seven of Diamonds, and the cards just below those in the extra hand, because the next higher ones are not in the game; and all cards just below any which have been already led. He who first gets rid of all his cards receives from each of the other players a counter for every card remaining in that player's hand. During the game, whenever a card is played corresponding to a pool-card, he who plays it takes all the counters on the pool-card, and any player not getting rid of a card corresponding to a pool-card must place upon the pool-card, for next hand, as many counters as are already upon it.

A card cannot be declared until it is shown.

Only one card can be declared at a time.

There is often a doubt whether a stop-card has been declared in time to stop another one declared apparently simultaneously. In this case, and in all others, the dealer is referee; or the player at his left, if the dealer is interested; or the player next at the left, if the question happens to concern the two first mentioned.

The game, as above detailed, is subject to the following variations:

Sometimes the pool-cards are all hearts, and the ten is added.

Sometimes the eldest hand alone

puts counters on the pool-cards, or "garnishes," putting one counter on the lowest, two on the next, etc.

Sometimes the "extra hand" is dispensed with. Beginners had better do so.

Sometimes the Seven of Diamonds is an "arbitrary" stop-card, that is, can be played whenever its holder pleases, he thus seizing the lead.

Sometimes the Nine of Diamonds is also made an arbitrary stop-card. In this case, when one arbitrary stop-card is played, the holder of the other can follow with it if he sees fit. The use of the two arbitrary stop-cards is recommended.

Sometimes the choice of suit for arbitrary stop-cards is auctioned off, the dealer acting as auctioneer, and the eldest hand making first bid.

If no bids are made, diamonds remain the suit. If another suit is bid for, diamonds may then be bid for also. After the auction:

(a) The successful bidder places the counters he bids, in the centre of the table.

(b) The player first "out" takes the aforesaid counters.

(c) If the players adopt that form of the game in which the pool-cards are all hearts, the other suit of the same color as the one chosen by auction, is entitled, as played, to the counters on the pool-cards.

The skill shown in this game is in knowing what to lead, and in remembering what has been played, so as to know when any card becomes a stop-card. The preferable leads are from suits in which the leader holds a stop-card. When the lead cannot be kept in this way, aces and the cards just above those in the extra hand should be led. Arbitrary stop-cards should not generally be played early in the hand.

History. Newmarket is derived from an old form of the game called Pope Joan, in which the Nine of Diamonds was called the Pope, and entitled the holder to certain priv-

ileges. In the play "A School for Scandal" Sir Peter Teazle speaks of "playing Pope Joan with the Curate." Pope Joan is the heroine of a legend of the Middle Ages, which tells how a woman, dressed as a man, became a priest and was finally elected Pope. The name Newmarket is probably from the English town of the same name.

NIGGER BABY. See ROLY POLY.

NINE HOLES. See ROLY POLY.

NINE MEN'S MORRIS, a game played by two persons, each of whom has nine pieces, or men on a board like that in the illustration.

None of the pieces, which are of two colors, are on the board at the opening of the game. The players take turns in placing their men, one at a time, on the places marked with numbers in the diagram, and afterward in moving them from one spot to the next, in any direction, along the lines. Each player's object, both in placing the men and in moving them, is to form a row of



Morris-board.

three of his own pieces; and when this is done, he may take from the board any hostile piece (called "pounding"); but he must not disturb a row of three, if there is any other that he can take. Usually he who first takes off all the hostile pieces wins, but sometimes, when a player is reduced to three men, he loses the game. The game is played

also on a board with diagonal lines at the corners, and sometimes, when either player has had all his men captured but three, he is allowed to "liop," that is, to play a man to any vacant spot on the board.

The player must avoid crowding his men together, and try to place them on the corners. He should devote himself to blocking his opponent, as well as to getting his own men into lines. When possible, it should be arranged to make more than one line in successive moves. When by moving one man backward and forward two lines can be alternately made and broken, the player is said to have an "open and shut."

Thus, if a player has pieces at 17, 20, 23, 21, and 24, by moving that at 17 to 18 and then back again, he can continue to make rows of three till his opponent can bring up a piece to block him.

History. Nine Men's Morris was played at least five hundred years ago, and the board then in use was exactly like the one in the illustration. In France, it was played with pawns or men, but in England commonly with stones. Shepherds in England sometimes cut the lines in the ground and make holes for dots. Shakespeare, in describing a stormy season, says:

"The Nine Men's Morris is filled up with mud." The game was called also Five-penny Morris, and Nine-penny Marl. The French call it Merelles, which is from a Greek word meaning divisions or partitions. Morris may be from the same word, but it is also the name of a dance, and some think that the game was so called from moving the pieces backward and forward as in a dance.

NITRIC ACID, Etching with. Nitric acid is described in C. C. T. To etch with it on copper or brass, warm the metal, and then rub it with a piece of wax so that the metal will be covered with a thin

layer of wax. After it has cooled, draw in the wax the design to be etched, with the point of a knife, a needle, or any other sharp instrument, taking care to reach the surface of the metal. Then cover the metal with strong nitric acid. Soon bubbles will appear along the scratches made by the knife. Let the metal stand a few minutes longer, and then wash it in water and remove the wax, either by heating and rubbing, or with turpentine. The design will be found etched or eaten into the metal surface. This is because Nitric Acid does not act on wax, hence the wax layer protects the metal, except where the layer was scraped away with the knife.

Pour Nitric Acid on a bit of "Dutch leaf," which is very thin brass or bronze used by sign painters. The leaf will dissolve in the acid.

Put a bit of real gold leaf in each of two test-tubes or bottles, pouring Nitric Acid on one, and HYDROCHLORIC ACID on the other. Neither will dissolve the gold, but if the contents of the bottles be mixed, the gold will dissolve. This mixture of acids is called *aqua regia* (Latin for royal Water), because it is the only liquid which is able to dissolve gold.

NITRIC OXIDE, Experiment with. To make Nitric Oxide gas, arrange the apparatus exactly as for making HYDROGEN, except that copper clippings are put into the bottle instead of zinc, and Nitric Acid poured into the water instead of sulphuric. When a jarful of the gas has been collected over water, remove the jar and turn it mouth upward. The gas, being lighter than air, will rise; but, though it was colorless in the jar, as soon as it enters the air outside it appears as a cloud of reddish brown vapor. The reason of this is that it unites with the oxygen in the air to form another gas called Nitric Peroxide, whose color is red.

NIVERNAISE, a SOLITAIRE game

of CARDS played with two full packs. The player lays the first four cards played in his left hand in a vertical line, and four more on his right, and then places six piles of four each, one pile at a time, in a row between. The Aces and Kings in the side rows, or on top of the piles, are now removed and placed in two rows below, Aces in one row, Kings in another. Any Ace or King thus uncovered in a pile is placed in like manner. The player's object is to build up families by suits, downward from the Kings and upward from the Aces. He may use, in building, the top card of any pile, or any card in the side rows. Vacancies in the side rows are filled either from the top of the piles or from the pack. When all possible cards have thus been used in building, four more are placed on each pile, and so on till the pack has been used. The piles may be shuffled and relaid till the families are completed, the number of times the player is obliged to do so being a measure of his skill.

NOBLESSE OBLIGE, a game of CARDS played by three persons with a EUCHRE pack. The dealer, who is determined by the lowest cut, lays aside the four Aces, and then deals the other cards one by one, placing the last, or twenty-eighth card, face upward on the table. The dealer, if he can, leads a card of the same suit as the twenty-eighth card. If he cannot, the lead passes to the next, and if the next cannot, to the third player. Who ever leads thus places the twenty-eighth card in front of him and counts it as a trick. Play now goes on, as in WHIST, but with the following differences: If a player hold both court cards and plain cards in any suit, he cannot win a trick second or third hand unless a court card has already been played in that trick. If no court card has been played, he must play his lowest plain card, losing the trick. If he hold only plain cards,

or only court cards, in any suit, there is no limitation on his play. The winner of the last trick takes also the four Aces.

The score is one for each trick won (including the twenty-eighth card), two for the four Aces, and one for each court card held at the opening of the hand. The player with the highest score wins, each hand being a game by itself, or the players may agree on a number of points to be played for.

RULES OF THE GAME.

1. If there is a misdeal, the deal is lost, and passes to the next player on the left.

2. If a card be exposed, it is named, and the dealer takes possession of it, placing it on one side. The exposor loses one point.

3. A revoke, or attempt to win a trick where the rules forbid, loses the offender all score for honors, and the tricks gained, by thus breaking the rules.

4. The dealer must see all penalties enforced.

5. Only the trick preceding the one in play may be seen.

Noblesse Oblige is a French proverb, meaning "Rank imposes obligation," that is, more is expected of a noble than of a common citizen. The name is given to this game on account of the obligation not to take the trick which the holding of "nobles" (court cards) imposes on a player.

NONSENSE, a game played by any number of persons, sitting in a circle, who make a comical sentence by each furnishing one part of speech. One of the players begins by whispering to his left-hand neighbor an article; the latter whispers to his left hand neighbor an adjective, and then in turn the others whisper in like manner a noun singular, a verb, an adverb, a number, an adjective, and a noun plural. Each in order then tells the word whispered to him, and a sentence is

thus formed; for instance, "The solemn grasshopper ate gleefully forty-three infuriated lobsters." The parts of speech may be varied to suit the players.

They are sometimes printed on cards of different colors, the nouns, for instance, being blue, the adjectives red, and so on. These are dealt to the players, and then each one reads a card of the proper color at random. A kind of SOLITAIRE may be played with these cards, the player arranging them in rows, backs upward, in the proper succession of colors, and then turning them over.

The following are examples of other arrangements of the parts of speech. Article, adverb, adjective, noun, adverb, verb, article, noun. Adverb, adjective, noun-plural, verb, noun-plural, conjunction, verb, adjective, adjective, noun.

NORSEMAN, a game of CARDS played by two to ten persons, with a full pack. Only a EUCHRE pack of 32 cards is used in playing, the remainder, called the "Low Pack," being used only to determine the trump. The two-handed game will be described first. The deal is decided by cutting, the lowest card dealing. In both cutting and playing the cards rank as in ECARTÉ, the Ace ranking between the Ten and the Knave. The dealer gives each player five cards, one at a time, and then cuts the Low Pack for his opponent to turn the trumps, of which there are two, one in a red and the other in a black suit. The top card of those remaining on the table is turned for the first trump, and the next one of a different color for the other. Each of these trump suits counts as such only in its own color. Thus, if Spades and Hearts be the trumps, a Spade will take any Club, but is treated like a card of an ordinary suit with regard to Hearts and Diamonds. When the trumps are turned, each player has the privilege of discarding three

cards or less, and supplying their places from the stock. The elder hand discards first, and if he take less than three, the dealer may take what he leaves in addition to his own three. Either or both may refuse to discard at all. Both must discard before either take cards from the stock. After the discard, each of the players throws two dice, one with red and one with black spots. The sum of the spots on the two black and two red dice, respectively, determine two cards, one in the black and one in the red trump suit, which are the highest trumps in those suits for that hand. These are called Rovers, or Special Trumps. Thus, if one player throw a red five and a black four, and the other a red four and a black six, the Nine of the red trump suit and the Ten of the black trump suit are the Rovers. The Ace counts as either one or eleven, and the Knave as twelve. The King and Queen are never Rovers. If the sum of the spots in either color should be less than seven, there is of course no Rover in that color, since seven is the lowest card in the Euchre pack. When the dice of one color are Ace and Ace, or Ace and Two, the trumps of that color are degraded to the rank of ordinary cards for that hand. When Spades are trumps, the Knave of Spades is called "Norseman," and will take any card in the pack. Norseman is the only card that is a trump outside its own color.

Each player now looks at his hand, and if either has both Rovers, or Norseman and a Rover, he wins the game at once, without playing a card. This is called winning "by hand." If Norseman be also a Rover, his holder also wins by hand. If no one wins thus, the elder hand leads, and the cards are played as in Euchre, or any ordinary two-handed game of cards.

Suit must be followed if possible; if not, a trump of the same color as

the card led must be played. If neither of these things can be done, a card of the other color may be thrown away. Norseman and the Rovers may be "reneged," that is, their holder is not obliged to follow suit with them, but may play them when he pleases. Each trick taken counts one, and the same player continues as dealer till one of them has won the game, either by making five points, or "by hand," as described above.

Four-handed Norseman. Two play as partners against the other two, partners sitting opposite, as in WHIST. Five cards are dealt to each. The dealer and elder hand throw the dice to determine the Rovers. The players discard in order, beginning with the elder hand. He and the next player may not discard more than three apiece; but if they take less, the others may each take what his partner left. Thus, if the best player takes two cards and the second none, the third may take four and the fourth six. In this way twelve cards, all that remain in the stock, may be taken. In other respects the game is played like two-handed Norseman.

Three handed Norseman. The Low Pack is not used. After dealing, the dealer places the stock before the player on his right, who is called Poney, and cuts. Poney turns up the top card of those remaining on the table, as first trump, and the next of the other color as the other trump. The intermediate cards, if there be any, he takes into his own hand, where they are called Reserved Cards. Each player must discard his whole hand, or none at all, and if Poney discard, he must reckon the Reserved Cards as part, or all, of the cards he takes in. Should there be more than five Reserved Cards, he may return which he pleases to the stock. If Poney does not wish to discard, he must lay aside all his Reserved Cards.

The holder of a Rover, or Norseman, must lead it at the first opportunity.

Norseman as a Round Game. Any number less than ten may play, and five cards are dealt to each from the full pack. Each player has two dice, one with red and one with black spots. To determine the dealer, the cards are thrown around, and he to whom the first Ace falls, deals. The trumps are determined before dealing, the player on the dealer's right cutting while the dealer turns them up. After the deal, each player throws his dice, and each one's dice, with those of the dealer, determine the Rovers for his own hand. Before playing begins, each one in turn, beginning with the eldest hand, either lays his Rovers face upward on the table, securing one for each, or declares that he has none. Rovers thus laid down remain so till played. In play, the Rover last played is always considered the highest. Thus, if one player put down the Ten of Hearts, it being a Rover, and the next the Three of Hearts, it being also a Rover, the latter takes the trick, unless some one else plays another Heart, Rover, or Norseman, afterward. Each trick counts one point, except the last, which counts two. Whenever Norseman is played, its holder scores two at once. The first player to score ten wins the game. The elder hands thus have an advantage, which is offset by that given the younger hands in allowing the later Rover always to take the earlier. The deal does not pass to the left, but is determined anew each hand, as at first.

Instead of turning trumps before the deal, there may be no trumps at all, in which case the sum of the red spots, for instance, on the dice thrown by any player and the dealer makes a red card of either suit in that player's hand a Rover. In this case, two Rovers of the same color

count only one point, though they must both be laid on the table.

RULES OF THE GAME.

1. A misdeal loses the deal, and one point is deducted from the dealer's score.

2. No hand can be altered after all have discarded.

3. A revoke or a neglect to play a trump of the same color, where it is possible, loses the offender one point.

4. The dice must remain on the table, as thrown, throughout the hand.

5. A card played out of turn cannot be taken back.

6. Any player may count the stock, or ask about exposed or played Rovers (This rule applies particularly to the Round Game).

NORTHERN SPELL. See **KNURR AND SPELL.**

NOUGHTS AND CROSSES. See **TIT-TAT-TO.**

NOVELS. A game played by any number of persons, with pencil and paper. The players usually sit around a table, and after they have agreed on the title of the novel they are to write, one of them begins it, writing a given number of lines. He then folds over the paper

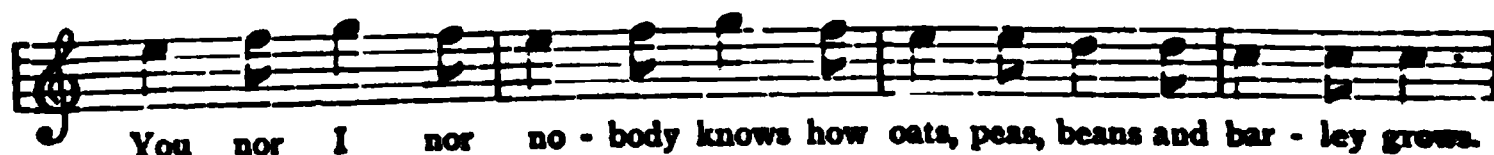
so as to hide what he has written, and then hands it to the player on his left, telling him only the last word he wrote. That player must continue the story as well as he can, and then each in turn takes it up, each writing the same number of lines and each telling his neighbor the last word. The last player must write an ending to the story, which is then unfolded and read aloud. If it is desired, more than one story can be written at the same time, each beginning and ending at different players from the others. Besides the subject of the novel, the names of its hero and heroine can also be agreed upon beforehand.

NUMBER ELEVEN, a SOLITAIRE game of CARDS, played with one or two full packs. The cards are played so as to form two rows, six in one and five in the other. Any two cards on the table, the sum of whose pips is 11, are now laid aside, and their places filled from the pack. If King, Queen, and Knave are in one row, or of one suit, they also may be removed. This goes on till the pack is out, or there are no cards on the table which can be removed. If the former is the case, the player has won.

O

OATS - PEAS - BEANS, a game played by any number of children, who join hands in a circle and

dance about a boy who stands within. As they dance they sing



Then they stop, and letting go of hands sing to the same tune,

Thus the farmer sows his seed,
Thus he stands to take his ease,
Stamps his foot and claps his hands,
And turns around to view his lands.

While the first line is sung, each swings his hands as in sowing seed; during the second, each rests his hand on his hips; during the third, each stamps his foot and claps his

hands; and in the fourth, each turns around. Then joining hands again, they circle about as before and sing to the same tune,

Waiting for a partner,
Waiting for a partner,
Open the ring and take one in,
And kiss her when you get her in.

The circle then stops and the boy within selects a girl from the players, whom he kisses, and who must then stand beside him in the ring. Joining hands again, the players circle about them, saying:

Now you're married you must obey,
You must be true to all you say,
You must be kind, you must be good,
And make your husband chop the wood.

The boy now joins the other players in the circle, leaving the girl alone within, and the game begins anew, the only difference being that a boy is chosen from the circle instead of a girl.

This game is said to be unknown in Great Britain, but it is common in most of the other countries of Europe. It is mentioned by the chronicler Froissart in the 14th century. In France, Spain, and Italy, there are also verses telling how the farmer reaps, and describing his other labors. Some people think the game was originally played by peasants in seed-time, in the belief that it would make the corn grow.

OBSERVATION, a game played by any number of persons, each with a pencil and paper. Any number of articles, of any kind are placed on a table in the centre of a room, and the players, forming in line, march into the room, around the table, and out again. Each then writes on his paper the names of as many of the articles on the table as he can recollect. The longest list is then read, and the reader scores for each article as many points as the number of players who have not its name on their lists. As each article is read, its name is crossed off by all who have it, and, when the longest list has been exhausted, any remaining names on other lists are

read in like manner. When a dispute arises as to whether any article has been sufficiently or properly described, it may be decided by a majority vote, or by an umpire, not one of the players, especially chosen for the purpose.

Unconscious Counting, a kind of Observation, in which each player tries to tell at a single glance the number of dots on a piece of paper. The dots, from 10 to 15 in number, are made in irregular order, and the paper is then shown quickly to each player for so short a time that it is impossible for him to count them one by one. The best plan is to make large dots and hold the paper up for an instant where all can see it at once. If it is shown to each separately, it is hard to make the intervals of time exactly equal, and therefore strictly fair to all. He who comes nearest to the right number scores a point; or if the nearest guess is made by two or more players, each scores a point. Another group of dots is then made and shown to the players.

After this has been repeated a number of times agreed on beforehand, he who has made most points is declared winner. The one who makes and shows the points does not take part in the guessing, and is chosen from among the players for each game. Another method of scoring is to give each player the difference between his guess and the real number of dots. The one who has the fewest points at the end of the game is then the winner. To avoid the influence one player's estimate might have on the others, each must write his guess on a piece of paper before any of the guesses are announced.

The power of thus estimating, or unconsciously counting a number of objects, is largely increased by practice. An English arithmetician named Dase could thus give the number of sheep in a flock, or of books on a shelf, up to thirty, at a

single glance. Nearly any one is able thus to count three or four, and sometimes more, and the number is easily extended. In practising unconscious counting, the number of dots should be gradually increased, and arranged at first in regular order, the arrangement being made more and more irregular.

ODD AND EVEN, a game played by two persons, one of whom holds any number of small objects, while the other guesses whether that number is odd or even. If he guesses correctly, he wins. The objects are usually such as can be held in the closed hand, such as pennies, beans, or pebbles, but fingers may be held up instead.

History. This amusement is very old. The Romans called it *Par Impar* (Odd-Even) and the Greeks named it also *Zuga é Aruga* (Yokes or no Yokes), for what reason is unknown. The name may be a corruption, since the similar Sanskrit words *yuj* and *ayuj* mean odd and even.

OLD MAID, a game played by any number of persons, usually not more than six, with a pack of cards, from which three of the Queens have been taken. The remaining Queen, usually the Queen of Hearts, is called the Old Maid. The cards are dealt one by one, and then each one throws on the table all the matches or pairs of like cards that he has in his hand. Each then, beginning at the dealer's left, draws a card from the hand of the player at his right. If the card so drawn matches any that he has, the two are thrown on the table; otherwise the turn passes to the player at his left. When all the cards have been matched excepting the Old Maid, the player holding that card is said also to be the Old Maid. Much of the amusement of the game is caused by the efforts of the player who finds the Old Maid in his hand so to place her that she will be drawn by his neighbor. Sometimes the matches,

instead of being thrown out all at once, are played in turn, one at a time, so that, if one player begins to draw before his neighbor, he may break one of that neighbor's pairs in drawing. Sometimes, instead of taking out three Queens at the beginning, a card is drawn from the pack at random and laid aside, and at the end of the game one of the mates of that card is left in a player's hand, the other two having been matched. This form of the game is not so interesting as the other, as in it no one knows what card is Old Maid.

Packs of special Old Maid cards are sold at toy stores, bearing all kinds of comic figures, including one of the Old Maid. With these the game is played in the same way as with ordinary playing cards, save that no cards are thrown out of the pack at first, as there is but one Old Maid.

In Germany this game is called *Schwarzer Peter* (Black Peter), though it is not like our game of that name. Instead of a Queen, one of the Knaves is used, and the player left with it has his face blackened with soot.

OLD SLEDGE. See ALL FOURS.

OLD STAGER, THE, a SOLITAIRE game of CARDS played with two packs. Three rows of thirteen cards each are first laid down. Whenever a King falls directly below a card of the same suit, it may be removed to the adjoining place and the space left is filled with the next card. The Aces, as they come, are laid in a row, and families are piled on them in order, by suits, ending with the Kings. For this purpose only, the lowest row of cards can be used, except when there is a free space below some other card, when that card may be taken. Cards allowable to play thus are called free cards. Any free card can also be placed on any other free card just above or just below it in value, following suit. Useless cards are laid aside to form

stock, of which the top card can be used to build, or to fill a space in the rows. The next card on the pack can also be used for these purposes, except when the vacancy is in the top row, when only the stock-card may be used. If the families are not formed by the time the pack is gone, the three bottom cards of the stock may be taken in hand and played as before.

OLD WITCH, a game played by not more than ten children, one representing a mother, one a witch, and the others daughters, of whom the eldest is often called Sue, and the others are named after the days of the week, Sunday, Monday, Tuesday, etc. The mother, going out, charges her eldest daughter to take care of the rest. The witch then calls, and steals one of the children. This is repeated till all the children are gone. The witch then names each child after some eatable (often after different kinds of pies), and offers them to the mother to eat. The latter recognizes her children one by one, and sends them home. There are many varieties of this game, some of which are played partly in verse. Instead of Sue, a servant is left in charge in some versions of the game. The witch gets the servant out of the way by telling her that the kettle is boiling over. On the mother's return, the eldest daughter, or servant, when asked where the stolen child is, offers all kinds of excuses, suggesting that he is down cellar or under the table. The methods of playing the game are many, but its main features are the same everywhere. Sometimes the witch is named "Old Mother Cripsy Crops," or "Hipplety Hop."

History. The game of Old Witch, in various forms, is common in Europe, and is probably many centuries old, being a sort of drama founded on a fairy tale. There are many German forms, of which one, "Old Urschel," corresponds nearly

to ours. In Sweden the mother is called Lady Sun. In some countries a hen and her brood are substituted for the mother and children. Sometimes the children represent pots of honey, as in the game of HONEY-POTS.

OLIVE · OIL, Experiment with. Pour a little oil into a glass of water. The oil will float on the surface of water. Pour some into a glass of alcohol, and the oil will sink. The object is now to make such a mixture of alcohol and water that the oil will neither rise nor sink in it, but stay wherever it is placed. This is done by trying various proportions. When the right one has been obtained the oil will sink just below the surface and form a perfect globe. By pouring more of the mixture above it, the globe of oil is made to float motionless in the centre of the fluid. The reason the oil forms a globe is that that is the natural form of any mass of liquid when there is nothing to pull it out of shape.

OLIVER TWIST, a game played by any number of persons, with a pack of cards on which are pictures representing the characters in Charles Dickens's story of "Oliver Twist." Each character is on two cards, except Oliver Twist and the Artful Dodger, who have but one each. All the cards are dealt to the company, one by one, and then the holder of Oliver shows it to the company and returns it to his hand. Each now places on the table all the matches, or duplicates, in his hand, and then each in turn, beginning at the dealer's left, draws a card from his right-hand neighbor and throws on the table the match, if any, that it makes with a card in his own hand, as in OLD MAID. When anyone draws Oliver, he shows it and calls "More," whereupon each of the others gives him a card. The holder of Oliver need not match unless he chooses. The holder of Artful Dodger is allowed

to draw two cards at a time, save when he is also the holder of Oliver. The game goes on till no cards are left but Oliver and Artful Dodger, when the latter must be thrown on the table, and the holder of Oliver wins.

ONE OLD OX. See REPEATING GAMES.

ONE, TWO, AND THREE, a game played by any number of people, one of whom leaves the room, while the others agree on three objects or persons. These are numbered, and the player outside is then called in and asked what he will do with one, two, and three. If he decides to do what is possible under any circumstances, another person takes his place; but if one or more of his wishes are impossible, he pays a forfeit for each and goes out again.

For instance, the company may decide on the steeple of Trinity Church (one); the president of the United States (two); and a goat (three). On being called in, the player who left the room says, "I will paint *One* sky-blue; I will enclose *Two* in a dry-goods box and ship it to Australia; and I will hold a conversation in Latin with *Three*". The first two, though absurd, are possible, but the third is not, under any circumstances whatever, so the player pays one forfeit and leaves the room again.

OPERA GLASS, Experiment with an. It is an interesting experiment to find the magnifying power of an opera-glass, which can easily be done as follows: Hold one tube of the glass in front of one eye and nothing before the other eye, so that two images of the object looked at will be seen at once, one natural size and the other magnified. It can then be easily estimated how much higher one is than the other. In ordinary opera-glasses the height is magnified from two and a half to three times. Field-glasses sometimes magnify as much as seven times. To tell the magnifying

power still more exactly, a tape-measure should be looked at through the glass in the same way. If one foot on the magnified image is as long as two feet eight inches, for instance, on the natural image, the glass magnifies two and two-thirds times. Instead of a tape-measure a brick wall may be looked at, or anything having regular divisions.

OTI-DAMA. See JACK-STONES.

OXYGEN, Experiments with. (Names and processes merely alluded to in this article are fully explained in CHEMICAL EXPERIMENTS. Oxygen gas is described in C. C. T.) To make it, equal quantities of powdered chlorate of potash and black oxide of manganese are mixed, and a glass phial about two inches long is one-third filled with the mixture. The neck is closed with a cork, through which passes a tube, whose other end is arranged to collect the gas under water. The bottle is supported on its side by two blocks of wood so that it can be heated by an alcohol lamp or Bunsen burner placed under it. Heat first the part of the mixture nearest the delivery-tube. If the gas is made too rapidly, remove the flame for a moment. The oxygen can be stored in a gas-holder, if desired, and kept for future use. The oxygen made in this way comes from the chlorate of potash (see Potash, C. C. T.), and is separated from the other elements in that substance by the heat applied to it. The only use of the oxide of manganese is to cause the gas to escape slowly and regularly, thus preventing an explosion; but how it does this has not been satisfactorily explained.

Another way of making oxygen is to heat red oxide of mercury in the apparatus just described. Oxygen is a little heavier than air, so if the jar in which it has been collected over water be turned right side up very carefully, the gas will not escape if the air is still; but it is better to lay a piece of glass over the

mouth of the jar. The glass may be slipped under the jar before it is removed from the water, which will prevent any loss while it is being turned over.

Experiments. Light a splinter of wood, and after it has burned a few seconds, blow out the flame, so as to leave the end glowing, and then plunge it into the oxygen. It will light again with a puff, and burn brightly. This is because pure oxygen feeds flame much better than when it is diluted with nitrogen, as in ordinary air (See Air, C. C. T.). For the same reason any substance will burn more brilliantly in oxygen than in air. Substances used are best held in the oxygen in a deflagrating spoon, but may be introduced in any other way. Most substances so burned produce disagreeable fumes, which may be

gen); sulphur (observe the same directions); and iron. The iron should be in the form of fine wire, or a steel watch-spring may be used. Heat the end of the wire and then dip it in powdered sulphur, some of which will stick. Then light the sulphur, and thrust the iron into the oxygen. The burning sulphur will presently light the iron, which will burn, sending out brilliant sparks.

Oxygen will not burn in air, as may be seen by trying to light a jet of it from a gas-holder. But it will burn in hydrogen, as can be shown thus, with a little skill. Cut the bottom from a bottle and hang it by its neck from a nail. Through the cork pass a tube from a gas-holder full of hydrogen, and regulate the flow so that when the gas is lighted at the bottom of the bottle it will burn there quietly. Do not light the gas till the air is all driven from the bottle. From another gas-holder pass a stream of oxygen through a glass jet, and raise this jet into the bottle. As the jet passes through the burning hydrogen, the oxygen issuing from it will take fire, and it will continue to burn in the hydrogen within the bottle. The reason of this is that when most things burn they unite with the oxygen of the air; but as oxygen of course cannot unite with itself, it is necessary to surround it with some other gas for which it has a liking. Instead of hydrogen, ordinary illuminating gas may be used, and instead of a bottle, a lamp chimney, or anything of glass that is open at both ends. In all cases the upper end must be tight, so that the hydrogen may not escape at the top.

Deflagrating Spoon in Jar.

kept from escaping by covering the jar with a piece of pasteboard through which the handle of the spoon passes: The things that burn with the prettiest effects are: charcoal (a piece the size of a pea; light it by holding the spoon in a gas-flame before putting it into the oxy-

P

P'S AND Q'S, a game played by any number of persons. Each in turn gives the name of a historical personage, and his left-hand neighbor names the place where that personage has gone to fight. The latter must be either the native place of the character, or the name of some battle in which he took part, and must begin with no letter preceding P and Q in the alphabet. Each player warns the next to "mind his P's and Q's." If this rule is broken, the offender pays a forfeit, and the next player names a place which does not violate the rule. For instance:

1. "Julius Cæsar has gone to fight at"—

2. "Pharsalia. Grant has gone to fight at"—

3. "The Wilderness." "Sherman has gone to fight at"—

4. "New Hope Church."

This last requires a forfeit, since its first letter, N precedes P in the alphabet.

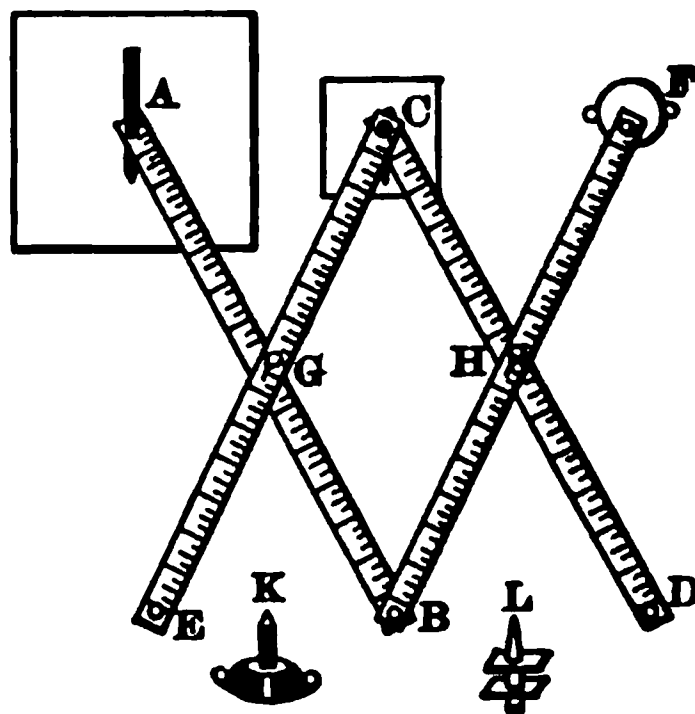
The fifth player supplies a proper answer; for instance, "Savannah," and the game goes on till the players are tired, or a sufficient number of forfeits have been collected.

PAIR OF SHOES, a game played by any number of persons with two packs of cards, one bearing pictures of men of various trades or professions, and the other pictures of shoes. In both packs each picture is borne by two cards. At the beginning of the game the shoe cards are in a pile on the table, face upward. Four of the other cards are dealt to each player, and four on the table, face upward. When any player's cards are gone, the dealer gives him four more, and so on till the pack is exhausted. Each player, in turn, takes from the table any card which he can match from his hand, places

the two cards by themselves, and then takes the top shoe-card. If he can match nothing, he places his card on the table with the others, not taking a shoe-card. If a player have a card with a policeman on it (called a police-card) he can either take all the cards on the table, and two shoe-cards, or lay it on the table, saying "Police," when all the players must place their cards on the table, and the holder of the police-card may take as many matches as there are, with a shoe-card for each. But if he call "Police" and any player have the other police-card, the latter may take the former and three shoe-cards. Each player keeps his shoe-cards by themselves, and at the close of the hand throws out all those not in pairs. The rejected ones are used in the next hand, and so on till they are all paired, when the holder of the most pairs of shoes wins. Any hand comes to an end when the shoe-cards have been all taken, no matter whether the other cards have all been dealt or not.

PALMISTRY. See FORTUNE-TELLING.

PANTOGRAPH, an instrument



Pantograph.

for copying maps or drawings, or enlarging or reducing them in size. A simple one may be made by fastening four pieces of wood together, as shown in the diagram. They can turn freely on each other at C, B, G, and H. At A is fixed a lead-pencil, and at C a metal point. The end F is fixed to the table, so that it will turn freely. Now, if a map be placed under C and a piece of blank paper under A, and if C be moved along the lines of the map, A will draw a similar map twice as large. If the pencil be placed at C and the metal tracer at A, the map will be reduced in size one half. These proportions may be altered by changing the positions of the points G and H where the pieces of wood are hinged together, so long as the opposite sides of the figure C, G, H, B, are always kept equal.

All parts of the pantograph should be supported at the same distance from the table, so that the motion may be even. The best way is to form the hinges at G, H, and B by screwing in ordinary screw-eyes from below, and to put in a fourth close by the pencil A, or a sharpened screw with two nuts, as L, may be used. The tracer C may be a steel nail of such a length as just to clear the table when the machine rests on the screw-eyes, and the end F turns on a steel nail in a small block of wood screwed to the table. The heads of these screws must be sunk in the block so that they do not prevent the stick from turning, or the block may be of the shape shown at K, with the fastening screws at the sides. If the pieces of wood be marked off in inches and fractions of an inch, it will be easy to vary the size of the drawing. This can be done by bearing in mind that the line drawn by the point A is always as much larger than that drawn by C, as the line A B is larger than C H. Hence if the drawing at A is to be made four times as large as that at C, the hinge must be moved half

way up to C. Since the opposite sides of the diamond must be kept equal, G must also be moved half way down to B.

A simpler pantograph than this, though it is not nearly so exact, can be made as follows: Take an elastic band from one eighth to one quarter of an inch wide, and cut it open, so as to make a single straight piece. Stick a pin through each end, and drive one of these pins into the table. Between the pins tie the elastic band tightly around a lead-pencil, as near the point as possible. If the free pin be now moved over the lines of any figure with the right hand, the pencil will trace the same figure on a reduced scale. The elastic must always be straight from pin to pin. It will be necessary to press lightly on the pencil with the left hand, to make it mark distinctly, but care must be taken that it is allowed to follow its own course. The drawing is always reduced, never enlarged, by this kind of pantograph. The scale depends on the position of the pencil; if it is halfway between the pins, the drawing will be reduced to one half the original size; if it is at one fourth the distance from the fixed to the free pin, the drawing will be one fourth the original size, and so on.

PANTOMIME, acting without speech. An entire play may be given in pantomime, or charades may be acted in it. In any case, the plot must be simple and the incidents such as to be easily understood by the spectators without the aid of words. Pantomimes generally depend for their effect largely on stage machinery, by whose aid strange or comical transformations take place. Many of these can be arranged only on a large stage, but others are more simple. For instance, objects can be made to disappear suddenly from the stage by fastening thread to them and jerking them to one side; and a table is easily provided with one or more holes in the top through which

an unseen performer takes away articles or supplies their places with others. Similar devices of many kinds may be arranged, and any one practised in sleight-of-hand tricks can introduce many variations.

In acting a pantomime, certain gestures and expressions are almost always used to express the same passions or feelings; thus, Anger is represented by scowling fiercely and clenching the fists; Hate, by turning away the head and making a motion as if pushing some one away with the palm; Love, by pressing the hands over the heart, with or without kneeling; Sorrow, by weeping or wringing the hands, and so on. Pointing with the finger is a gesture often used, and a question is denoted by raising the eyebrows. In comic pantomime, boards, or pieces of pasteboard, with words printed on them in large letters, are sometimes displayed where an idea cannot be conveyed by signs. Noises are often introduced, such as the barking of dogs, whistling, or crowing.

The custom of "mummers" or maskers, persons dressed in odd costumes parading about the streets, which is still kept up in some places in this country on Fourth of July or New Year's Day, and in Europe at the Carnival, was a sort of pantomime. The illustration shows some ancient English maskers.

PAPER BANDS, Experiments with. Take three strips of paper, each about an inch wide and six inches long, and make them into bands by pasting the ends together.

Paper Bands.

In pasting the first bring the ends together squarely to make an ordinary ring, as at 1 in the illustration; with the second, give one end a

English Maskers.

twist before pasting it to the other, two twists, as at 3. Cut each band as at 2; and with the third, give it in two lengthwise along the dotted

line. From the first will be obtained two separate rings as at 1'; from the second, a single ring of half the width and twice the diameter, as at 2'; and from the third, two rings linked together, as at 3'.

PARALLELS. See **PROVERBS.**

PARLOR RACE, a game played by four to eight persons, with 52 cards, each bearing the name of a race-horse. Each name is on four cards, so that there are thirteen horses in all. The horses are numbered from 1 to 13. There are three ways of playing the game, called respectively the Flat Race, the Hurdle Race and the Scrub Race.

Flat Race. Enough of the cards numbered 13 are thrown out to make each player's number the same, and the remainder are then divided equally. Each names his favorite racer, which should be the one of which he has most in his hand. The eldest hand leads a card, calling out its number, and the next player puts down any card he pleases, adding its number to that of the previous card, and calling out the sum. Each in turn does the same, until some one plays a card which makes the sum 31. This card is called the winner of the heat, and its holder leads for the next heat. Every player must win if he can. If a player have no card that will make the sum 31 or less, he must say "I pass," and the next in order must play. If all the players pass, it is a "dead heat." When the cards are out, they are dealt again, and the game goes on till some racer has won four heats. The player who named it as his favorite wins the game. It makes no difference whether a player's favorite wins in his own hand or in that of some one else. Often a player is obliged to win a heat with another's favorite. By watching the cards as they fall, it is possible for a player to guess in whose hands his favorites are, and to play in such

a manner that they will be obliged to win.

Hurdle Race. The sum of the cards played may be as large as 33, but no card which makes it either 29 or 30 must be played. The number 31 is called the Hurdle, and a racer making the sum 31 is said to "stumble on the Hurdle," and is not allowed to win the heat. When the sum is 28 or less, any racer making it either 32 or 33 "leaps the Hurdle" and wins the heat. When a horse stumbles, the next player counts from the number from which the stumbler started. No player is allowed to pass to avoid stumbling. In other respects the Hurdle Race is like the Flat Race.

Scrub Race. All the cards are dealt. The leader lays down a card, and those like it must be played at once. If any player has more of them than any other player, he takes the trick but if each have one, or if two have two a piece, the trick belongs to no one. This is entirely a game of chance.

PATCHESI, or PARCHESI. A game played on a board like the

A

Patchesi Board.

one in the illustration, by two, three, or four persons, each with four

pieces, or men, and one die. The players sit around the board, and each places his men in the circle at his right. Thus, the player who sits at A places his men in B, and so with the others. In the beginning The players throw their dice, without taking turns, until some one has thrown a five. That player enters one of his men on the colored space at the left of his circle; for instance, if it be A, he enters his man at C. The players then take turns in throwing, beginning at his left hand. Each makes one throw at a time, but no one can play till he throws a five, when he enters one man, like the first player. When his next turn comes, he moves his man forward a number of spaces equal to the number he throws with his die. If he throw another five, he may enter another man, or move the one on the board forward five spaces, as he pleases. Each player moves his men around the board, going from right to left, till they reach the red path directly in front of him (called his gravel path), and then up this path into Home. (A's gravel path is indicated by the letter G).

RULES OF THE GAME.

I. If a player throw a six, he plays twelve, and must throw again. A second six gives him the same privilege; but if he throw six a third time in the same turn, he must place his foremost man in his circle to be entered again as at the beginning of the game.

II. If a player can move any of his men into a space already occupied by a single man belonging to an enemy, he may do so, and take that man up, placing him in the circle where he began the game, where he must be entered as before.

III. No man can be taken up when he is on a colored space (called a safety point); and as only one man at a time can occupy such a point, a player loses his turn if

the only moves he can make bring him into occupied safety points. [As the space on which a player enters his men is a safety point, he cannot enter if it is occupied either by an enemy's man or one of his own.]

IV. Two of the same player's men in one space form a blockade, which neither he nor any one else may pass, and neither of the men in a blockade can be taken up.

V. More than two men cannot be placed on the same space.

VI. When a player is on his gravel-path he cannot move if he throw a number larger than is necessary just to take him home. [For instance, if he is on the fifth space from the end, he cannot play a six, and if he is on the last space, he can play only an ace.]

The game of Patchesi resembles Russian BACKGAMMON, from which it differs by requiring always the same number to enter, by allowing not more than two men on one point, by giving a separate space to each player when he throws off his men, and by the use of safety points and blockades. Some of these differences make it more complicated, but the fact that each player has only four men tends to simplify it.

History. This game, which is of Hindoo origin, is called in India *Pachisi*. It is widely played in Asia, in some countries with flat tamarind seeds instead of dice.

The Spanish explorers found at the court of Montezuma, the Aztec ruler of Mexico, a similar game, called Patolli, played like Backgammon, but on a cross-shaped table. Marked beans supplied the place of dice. Some people think the game had been brought to Mexico from Asia.

PATCHWORK STORY, a story made up of words and sentences cut from newspapers and pasted on a sheet of blank paper. Several persons may join in the amusement,

one of whom superintends it, and pastes the words on the paper, while the others look over newspapers for suitable words and sentences, and cut them out. Each word, or combination of words, should be cut out cleanly and carefully. The paster makes a line of mucilage on the paper before him, and then, taking up the word or letter he wants with a pin or the point of a sharp knife, presses it into place. By using care, even separate letters may thus be combined into a word, which looks as if it had been printed as it stands. An amusing effect is produced by inserting sensational headings, or cuttings from advertisements, at intervals in the story. Care should be taken to have the paper look neat, and each sentence should begin with a capital, as in writing. Punctuation marks may be filled in with a pen and ink, or cut from a newspaper, like the letters.

The plot of the story may be decided on beforehand, and then newspapers may be searched for suitable words and sentences; but a better way is first to cut out all sorts of word combinations, and then fit them together to make the story, searching only for a word or words now and then to make the connections. In this way a very laughable tale may be put together. Instead of a story, a patchwork letter may be written to some absent friend, even the address being made in the same way and pasted on the envelope.

PATERNAL, a **SOLITAIRE** game of **CARDS**, played with a full pack. The four Aces are first placed in a row, and then the other cards are laid, as they come, in piles of three, spreading each pile a little, so that all the cards in it can be seen. The suits are to be completed by placing all the cards in order on the Aces. For this purpose only the top card of a pile can be taken, except that, once during the game, a card may

be drawn from the interior of a pile—but this privilege should generally be reserved till the end. In addition, any top card of a pile may be placed on any other top card of the same suit just above or just below it in rank, thus freeing the one beneath. The piles may be twice taken up, shuffled together, and re-laid. Sometimes, instead of allowing the player to re-lay the cards and to draw one, he is given the privilege of taking a King from the top of any pile, to form the bottom card of a new pile.

Skill must be used in changing about the top cards so as best to aid the completion of the suit piles.

Trlos, a variation of **Paternal**. The Aces are not laid down at first, but put down with the rest of the cards in the piles as they come. The last two piles contain only two cards each. The Aces are put out as they are freed by changing the top cards and the rest of the suits placed on them in order, as before. Top cards may be placed on other top cards of the next higher rank only, but without regard to suit. A face card may also be placed on a similar face card.

No pile may contain more than three cards at any time during the game, and there is no drawing nor relaying.

PATIENCE, GAMES OF. See **SOLITAIRE**.

PEANUT BUM, a scramble for peanuts, in which any number of persons may take part. A bag of peanuts, containing at least a bushel, is emptied in the middle of a large room with a bare floor. The contestants stand around in a ring, and, at a signal, rush forward. The object of each is to get the most peanuts, and to prevent the others from getting any, if possible, by pushing and pulling.

History. The Peanut Bum was once a common sport at Yale College, but is now discontinued. Early in the college term one was held at

each of the Freshmen society halls, the carpets being taken up and everything prepared for the event. Only Freshmen and Sophomores took part, the members of the two upper classes looking on. The Freshmen were expected to provide the peanuts, but the Sophomores, being better organized, and having the advantage of experience, generally succeeded in carrying away most of them. Many quarts of the nuts were trampled under foot in the struggle, and the bag containing them was torn into pieces, which were borne away as trophies. The sport seems to have begun about 1865. In 1880 the college authorities abolished the Freshmen societies, and since that time no Peanut Bums have taken place.

PEANUT SPREE, an entertainment in which various feats are performed with peanuts, the winners receiving prizes. Any number of persons may take part, but from six to ten is best. A leader is chosen, who arranges the programme of events, calls the names of those who are to take part, takes down their records with pencil and paper, announces the winner, and decides disputed points. Several quarts of peanuts are then spread on a table in the middle of the room. A list of events is given below, and others may be devised to suit the fancy of players or the leader.

1. A dish of any kind is filled with peanuts, and each player guesses how many it contains. He who comes nearest to the right number wins a prize.

2. He who can hold the greatest number of peanuts in one hand, without the assistance of the other in placing them there, wins a prize.

3. A peanut is suspended by a thread, and on the floor is placed a vase whose neck is just large enough to receive it. Each player, holding the thread so that the peanut is a foot or more above the vase, tries to drop it in. The one who succeeds

wins a prize. If no one succeeds at the first trial, each has another, and

Peanut Spree, No. 3.

so on. If two or more succeed, they try again, holding the peanut higher, until only one is able to do it.

4. Each person is given five peanuts, and at a signal all begin to shell them. He who finishes first wins a prize. The inner skins must be carefully removed, and no nut must be split into more than the two pieces into which it naturally divides. If a nut be broken, the player may take another to replace it.

5. Five peanuts are placed on a chair at one end of the room. Each player in turn must take them one by one and place them on a chair at the opposite end of the room, returning them in like manner. The one that does this most quickly wins the prize. Throwing the peanuts is allowed, but if one so thrown does not remain in the chair, the player loses his chance for the prize.

6. A large pin is stuck upright in the floor, and each player in turn pitches five peanuts at it, one by one. He who succeeds in making

a peanut remain nearest the pin wins the prize.

7. Each shells a number of peanuts, and he who can catch the greatest number in his mouth, in succession, after throwing them into the air, wins a prize.

8. A player is chosen by lot to stand at one end of the room with open mouth, while each of the others try to pitch five peanuts into it, one at a time. He who is most successful wins a prize. The one into whose mouth the nuts are thrown may be the player making the worst record in the event just preceding.

9. Peanuts are strewed over the floor of the room about a foot apart, and he who takes the least time to go from one end to the other and back, without treading on a peanut, wins the prize.

Other events may also be introduced, in which peanuts play no part. For instance:

10. A finger-ring is suspended from a chandelier. He who can walk up to it and, without pausing, stick a pencil or penholder through it, wins a prize.

11. A row of chairs is placed in the middle of the room, and he who can go in the least time from one end to the other, passing to the right of one chair and the left of the next, without touching a chair wins a prize.

12. A passage is selected from some book not familiar to any of the company, and he who can read it correctly, upside down, in the least time, wins the prize.

13. He who reads a similar passage at the greatest distance wins a prize. The book may be propped upright on a table, and each player in turn advances toward it till he can read the passage, which he whispers to the leader, to make sure that he has done so correctly. His distance from the book is then measured.

The prizes, which equal the events

in number, should be wrapped up in packages, so that it is impossible to tell what they are, and placed by themselves. Each prize-winner chooses his own prize and opens it immediately. One or two of the prizes should be useful or valuable articles, and the others ridiculous, or merely blanks. It increases the fun if the packages be marked with laughable titles or mock directions to the opener. Sometimes a prize is given to the person who gains most prizes during the entertainment.

PEA-SHOOTER. A tin tube two or three feet long is commonly used, and a supply of peas is usually kept in the mouth. Instead of peas,



Pea-shooter.

little wads of paper or lumps of putty may be used, and the toy is then sometimes called a Putty Blower. For shooting at a target little darts may be used, whence the toy is often known as Puff and Dart. The



Darts.

darts may be bought at toy shops or made from bits of stick considerably smaller than the tube, and about two inches long. A wad of yarn or worsted, like the bottom of a short tassel, is fastened to one end, by winding with linen thread, and a small steel nail is fixed in the other end, so that the dart will stick in the target. Great care must be used to shoot these darts only at a target, as some one might be hurt by them. In shooting, the aim should be quick, and as there can be no sighting, since the tube is held in the mouth,

the "point of aim" for different distances must be ascertained, exactly as in ARCHERY. The natives of Borneo use tubes ten or twelve feet long as weapons, blowing through them poisoned darts. For the toy, a tube about three feet long will do.

PEASE PORRIDGE, a game played by two persons, who sit opposite each other and strike each other's hands, keeping time to the following verse:

"Pease porridge hot,
Pease porridge cold,
Pease porridge in the pot
Nine days old."

The movement of the hands varies. A common method is as follows: For the first, second, and fourth lines, each player slaps his knees with both hands; then each slaps the other's right hand with his own, palm to palm; and then the same is done with the left hands. For the third line the order is, slap the knees, both hands at once, the one player's right to the other's left, right hands, and left hands.

PEDRO SANCHO. See ALL FOURS.

PEEL-AWAY, a game played by any number of persons on a field divided into three parts by two parallel lines, generally from 100 to 300 feet apart. The two outer parts of the field are called goals, as is shown below. Sometimes the field



has side lines (dotted in the figure,) beyond which no player may go, but often the field is unbounded at the sides. At the beginning, one of the players stands in the middle of the field facing the others who are in one of the goals. He cries "Pom, pom, peel-away, come away, I'll get you away," and they must then run toward the other goal.

As they do so, he tries to touch as many as possible, while they are between the goal-lines. All touched must join him in the centre of the field. They all shout "Pom, pom, peel-away" together, and the other players then run back across the field to the goal where they were at first, the ones caught aiding in trying to touch them. The game goes on till all have been touched, the last one touched being the winner. The one touched first stands in the middle of the field to begin the next game. The game is played best on the ice by skaters. Instead of the shout given above, the single word, "peel-away" is often used.

This game is called in England King Cæsar, or sometimes Rushing Bases. The player who first stands in the middle of the field is called the King, and he must clap each one he catches three times on the head, saying each time, "I crown thee King Cæsar." A player is allowed to return to the same goal if he hops out of it; but if he put down both feet, he must run to the opposite one. Unless a player is properly crowned, he may return to his goal, and when the Kings greatly outnumber the others, they may run in and try to pull the latter over the base-line.

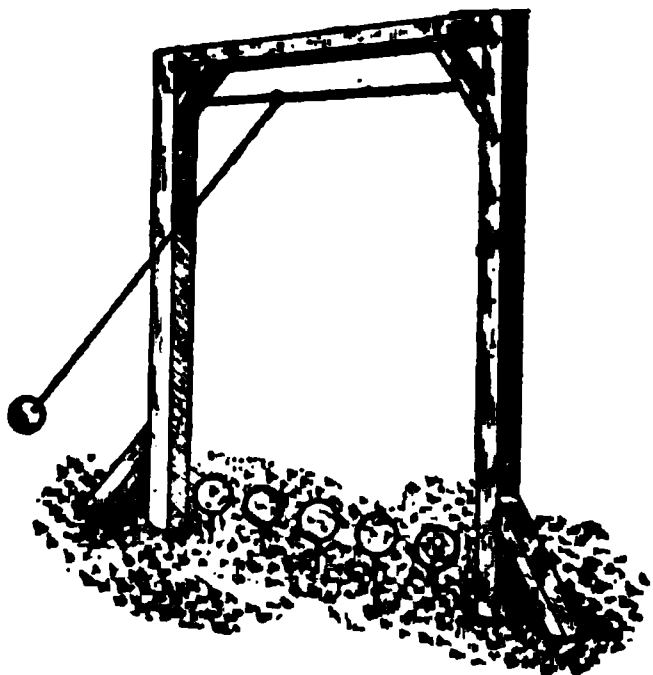
PEG-TOP, or **PEG IN THE RING**, a game played by any number of persons, each of whom has a common wooden TOP with an iron point, or peg. A circle about a yard in diameter is drawn on the ground with a stick, or on a pavement with chalk or charcoal, but bare ground is best. Any one who wishes begins by spinning his top in the circle, and the others follow in order, trying at the same time to split one of the tops in the ring. If any player fail to cast his top into the ring, or to set it spinning, or if it remains in the circle after it stops spinning, he must let it stay for the others to throw or "peg" at; but if it spin or roll out, or is knocked out by any

other top, the owner may take it up, and play as before, in his turn. Each player thus tries to split one of the tops without driving any from the ring, but this is usually very difficult. The tops used are best made of hard wood like box-wood, and should have long pegs, as they are then more apt to spin out of the ring. If a top that "sleeps," or spins in one place, is used, it generally stays in the ring and becomes a mark for the other players. In spinning, the cord should be wound several times around the peg, as well as the top, and the string should have a button at the end. Skilful players are able so to cast their tops as to hit any spot they wish. As the game is sometimes played, any one that knocks a top out of the circle is allowed to keep it.

PENCIL SKETCHES, a game played by any number of persons, each with pencil and paper. Each player first draws the head of a man, woman, or animal, and then folds down the top of the paper so as to hide all the drawing except a very little at the bottom. Each then passes his paper to his left-hand neighbor, who adds a body to the head, folding and passing as before. The feet and legs are next drawn, and then the papers are unfolded and shown to the company. The sketches are often very amusing.

PENDULUM, a lawn game played with rings and a pendulum. The rings, which are 8 inches in diameter, are not more than six in number, and each has a different color and a different value. They are fitted with prongs several inches long, so that they can be made to stand upright in the ground. The pendulum is a heavy ball suspended by a rope eight feet long from a ring sliding on a wire between two posts eight feet high and six feet apart. The rings are placed in line between the posts, and the object of

is to swing the pendulum so as to catch it and pull it from the ground. If successful, he scores the number marked on the ring, and has another turn until he fails. A line may be made on the opposite side of the rings, and any ring carried



Pendulum.

over it may score double its number. If a player hits a ring he did not choose, it is accounted a miss. The game may be played by any number of persons, each for himself, or divided into opposing parties. The winning score is fixed upon beforehand, or the game may be played for a certain length of time, at the end of which the person or side with the highest score wins.

PENDULUMS, Experiments with. The best pendulums for these experiments are made of the bobs used by carpenters for their plumb-lines, which can be bought at any hardware store. Or any small heavy object can be used, if it is easily fastened to a string. Suspend the pendulum bobs by twine of different lengths to screw-eyes fastened in the upper part of a door-casing. One should be made so that it can be lengthened or shortened at will, by passing the twine through the screw-eye, and holding it in the hand, or winding it loosely about a tack driven in the side of the doorway. By pulling on this string the pendulum will be shortened.

EXPERIMENTS.

1. Set all the pendulums swinging. The longer they are, the slower they will swing.

2. Make one of the pendulums swing an inch or so, and then make it swing two or three feet. It will take just as much time to make the short swing as the long one.

3. Count the number of swings any of the pendulums makes in a minute, and then arrange the adjustable one so that it makes twice the number. It will be just quarter the length of the first.

4. Take down all the pendulums but one. Set this swinging, and then, when it is at its lowest point, strike it sidewise. It will keep on swinging, but in a different direction. Strike it when it is at one end of its swing, and it will then move in a circle.

5. Make a heavy pendulum by suspending a chair with stout twine. Tie a fine piece of sewing-silk to the chair. Try to swing the chair by giving a single pull on the silk and it will break; but it may be made to swing by a series of gentle pulls given at equal intervals. To know at what interval to give the pulls, hang the movable pendulum so that its bob is at the middle of the chair, and then swing it. Give the silk a slight pull at each swing of this pendulum.

See also **DOUBLE PENDULUM.**

PETER CODDLE'S TRIP TO NEW YORK, a game played by any number of persons. The story of a countryman's trip to the city is printed in a little book, with blanks left for many of the words. Words to fill these blanks are printed on small cards, one on each card. One of the company is appointed to read the story, and the cards are distributed equally among the others. When the reader comes to the first blank, the player on his left reads his first card to fill it, and the other blanks are filled in the same way by the other players, in order. The

players should listen carefully for the blanks, and read the cards quickly, so that the story may be as smooth as possible.

There are a multitude of games of this kind, and a new one can be made by any ingenious person. Among those to be bought at toy stores are, "Jotham Podd's Trip to Paris," "Japhet Jenkins," "Travels of Sam Slick," and "An Excursion to Coney Island."

PHIAL BAROMETER. See **HYGROSCOPE.**

PHIAL OF THE FOUR ELEMENTS. See **MIXTURE OF LIQUIDS.**

PHILOPENA. See **FLOWER AND FRUIT SPORTS.**

PHOSPHORUS, Experiments with. Phosphorus is described in C. C. T. In experimenting with it, great care is necessary, because it takes fire on exposure to the air. It must be kept, handled, and cut under water.

EXPERIMENTS.

1. Cover a piece of phosphorus the size of a pin-head with a teaspoonful of lamp-black (see **CARBON**, Exp. 3), which has been heated and allowed to cool. The phosphorus will melt and finally take fire, owing to contact with oxygen absorbed from the air by the lamp-black.

2. Dissolve a bit of phosphorus in bisulphide of carbon, and wet a piece of unglazed paper with the liquid. The paper should not be held on the hand, but on the end of a wire. Take it into a dark room, and as it dries it will shine beautifully and finally take fire. Letters or designs can be marked on the paper with a brush dipped in the liquid, but the brush must be put into water as soon as it is used.

3. *Phosphorus Torpedo.* Cover a bit of phosphorus, the size of a pin-head, with powdered chlorate of potash, and twist it up in a bit of tissue-paper. On being struck with a hammer, it will explode.

4. *To make Red Phosphorus.* Heat

a small bit of phosphorus in a test-tube or bottle with a very little iodine. The phosphorus will turn red, and will be found to have almost none of the properties of common phosphorus, being odorless, not giving off light in the dark, and not being easily lighted by rubbing.

5. Place a piece of phosphorus under hot water. It will melt. Now bring a current of oxygen into contact with it and it will burn under water.

6. Put a crystal of iodine on a slice of phosphorus. They will take fire at once.

7. *The Phosphorus Sun.* Place a bit of phosphorus the size of a pea on a piece of chalk about an inch square, having its top hollowed a little. Fill with oxygen a fish-globe about a foot in diameter, and invert it over the phosphorus, first lighting the latter with a hot wire. The phosphorus will burn in the oxygen with great brilliancy.

8. Place in a bottle a tablespoonful of ether and a piece of phosphorus twice the size of a pea. Let it stand several days, shaking it occasionally. The resulting liquid will make the hands or face shine in the dark when they are rubbed with it. If a little be poured on a lump of sugar, which is then thrown into hot water, the phosphorus and ether will rise to the surface and take fire.

Put a bit of phosphorus into a flask containing a little water, and then boil the water; the phosphorus will burn with great brilliancy.

PHOTOGRAPH WHIST, a game played by four persons, with any number of old card-size photographs, which are dealt as in whist. Each plays one in turn, and the ugliest photograph takes the trick. If there is doubt, a fifth person should be chosen as umpire, to decide. This game is productive of a good deal of amusement for a few minutes, but care should be taken, in selecting the photographs, that no one's feelings are likely to be

wounded. It is best played at home with photographs from an old album.

PHOTOGRAPHY. If a double convex lens (C. C. T., LENS), such as that in an ordinary magnifying glass, be held at the proper distance between any object and a white screen or wall, an image of the object will be thrown on the wall. Thus, if such a lens be held near a wall having a window opposite it, and moved backward and forward, a position will be found where the lens throws on the wall a distinct picture of the window, upside down. In photography, such a picture is thrown by a lens on a surface covered with some substance very sensitive to light. Light changes the color of the substance, so that the whole picture is printed on the prepared surface. The effect of the light, however, is not visible till the picture is washed in another chemical, called a "developer." It is then washed in a third fluid to "fix" it, or make it permanent. If the lights and shadows are arranged in the picture as they are in nature, it is said to be a "positive"; but generally the chemical used is turned black by light, so that the lights and shadows are reversed. Such a picture is called a "negative" and to make a positive from it, it is fixed over a sheet of chemically prepared paper. The light shines through the negative, blackening those parts of the paper most that are most exposed, that is those that are light in the negative; hence the lights and shadows are reversed again on the paper, and appear in their proper places. This is called "printing." The ordinary instruments and processes used in photography will now be described.

Camera. The photographic camera is a box with a lens at one end for throwing an image of the object whose picture is to be taken. The image is formed at the back of the box, on a piece of ground glass, which can be adjusted at the proper distance from the lens. The most

important part of the instrument is the lens. Cameras can be bought as low as two dollars, but the lenses of such cameras are poor and will not make a clear image. Experts advise the beginner to pay at least ten dollars for his camera. Modern cameras are made in many different

be admitted to the plate. For instantaneous pictures very expensive lenses are needed.

Focussing-cloth. This is to cover the operator's head when he is adjusting the camera, to keep out the light. It should be about a yard square, of any material that is perfectly opaque. It may be made of water-proof cloth, so as to protect the camera in case of rain.

Focussing-glass. This is a little magnifying glass used to examine the image on the ground glass to see if it is perfectly distinct.

Plate-holder. This is a device for

Camera.

styles, and fitted with many patent devices, which it is impossible to describe here. The best cameras have what is called the "single swing," by which the ground glass can be tilted forward or backward, so that parts of a landscape at different distances may all be brought to a distinct focus. The best cameras have also a shifting front, by which the lens can be raised or lowered, thus bringing more or less of sky or foreground into the picture. These and other arrangements are useful but not essential.

Lens. A good lens must have depth of focus, that is, it must clearly define both distant and near objects; a good field, that is, it must take in many objects at once; and it must be fairly rapid in its action. It should be provided with "stops," that is, covers with holes of various sizes, so that more or less light may

Plate-holder.

keeping the sensitive plate from the light till it is ready to be used. It is then fixed on the back of the camera, in place of the ground glass, being so arranged that when a slide is withdrawn the sensitive surface of the plate receives the image.

Dark Room. For handling the plates before and after taking the picture, it is necessary to have a room or closet into which no light can possibly penetrate. The door must be tight and there should be no windows. A large closet will answer all purposes, but many amateur photographers have rooms specially built for this purpose. The closet should be as large as possible, to avoid discomfort from heat and bad air. It may be ventilated by means of crooked tin tubes, painted

black on the inside, fastened to a hole in the outer wall. It should be remembered that the faintest glimmer of outside light may spoil the plates. To enable the worker to see, a "ruby lantern" must be used. This is a lantern covered

Lantern for Dark Room.

with ruby-red glass, the light from which does not affect the plates. Many kinds are in the market, one of which is shown in the illustration. Instead of it, a lamp with a close shade of red tissue-paper may be used, but the lantern is best. In this room must be placed all arrangements for developing and fixing the negatives, as described below. These include shelves, a sink, running water, and three shallow trays of iron, glass, or rubber, for immersing the plates or prints. The same chemical should always be used in the same tray. The illustration

Rubber Tray.

shows a hard rubber tray, which may be bought of dealers in photo-

graphic supplies. The sink may be made of a large baking-pan having a pipe soldered to the bottom to carry off the water to a pail below. Running water may be obtained by putting a faucet in an ordinary wooden pail, which stands on a shelf above the sink. Over the faucet is slipped a rubber tube long enough to reach to the sink. For preparing the proper solutions, four "graduates" or measuring-glasses, are needed, one each of eight, four, and two ounces, marked with drams and one to measure minims, and for weighing chemicals a pair of scales is necessary.

Plates. Formerly every photographer prepared his own plates, but now they are generally bought ready for use. There are many kinds, some for landscape, some for instantaneous pictures, some for transparencies, and so on. All come in different sizes, and are packed by the dozen in paper boxes. The face, or sensitive side, of the plate can always be told from the back by its duller lustre. In preparing to take a picture, the first thing is to fill the plate-holder, which must be done in the dark room, the face of each plate being carefully brushed with a broad soft camel's-hair brush to remove dust. Each plate should be held at the corner only. Plate-holders generally hold two plates, and these should be put in back to back, so as to face outward. It requires practice to do this without touching the sensitive side of the plates, especially as the light in the dark room is very dim.

Taking the Picture. Place the camera so that the lens points toward the object or view to be taken, and then, throwing the focussing-cloth over the head, move the rear part of the camera forward or backward till the image on the ground glass is distinct. It often requires practice to see any image at all, at first, but by moving the eye backward and forward, it can be made to

appear. Before the final focussing, the camera should be moved so that just the objects desired appear on the ground glass. To include more of the upper part of the landscape, the sliding front may be raised. If this throws some of the lower objects off the glass, the camera should be moved farther back. The focus is now made perfectly distinct for some one object in the middle foreground, the operator viewing its image carefully with the focussing-glass. The images of more distant and nearer objects will probably now be a little blurred. To remedy this, one of the "stops" must be put on the lens. The largest should be tried first, and then a smaller one, till all parts of the picture are equally distinct. No smaller one than absolutely necessary should be used, as the smaller the stop, the less light falls on the plate. If there is an object in the very near foreground, it will be necessary to use the swing-back to make its image distinct.

The cap must now be placed over the lens, the ground glass removed, and the plate-holder put in its place, the focussing-cloth being thrown over it as it is taken from the box where it is kept, and remaining over it till it is returned to the box. This is necessary that light may not reach the plate through some crack in the holder. The slide is withdrawn, and then the light is admitted to the plate by removing the cap from the lens, taking care not to shake the camera in so doing. When the exposure is finished, the lens is recapped, the slide returned, and the plate-holder replaced in its box.

For the time of exposure, no rules can be given. It must be determined in every case by experience, as it varies with the light, the lens, the plate, the stop used, and the kind of picture. The time may thus vary from almost nothing, with a very sensitive plate and bright

light. In general a hazy or yellow light requires a longer time than clear weather, and the hours near noon less time than late afternoon. Spring foliage requires less time than the same in summer, and a sea view than a landscape. After the photographer has had experience he will judge of the time required by comparing the kind of view, the light, and the other conditions, with those of some previous picture he has taken. A second or two more or less is not fatal to success, but over-exposure is easier to remedy than under-exposure. The beginner should make several exposures of the same view, and note which one turns out best. The plate-holder should be marked after each exposure with the time, stop used, and other data to be remembered.

Developing. This process requires great care, and must be carried on in the dark room. There are many developing fluids, each of which has its advocates. The following directions show how to make one of the best. The solution is made in two parts, which are mixed as they are needed. Each may be held in a twelve-ounce bottle. The following chemicals are needed:

Sulphite of soda, crystals,	1 lb.
Carbonate of potash, granulated,	"
Carbonate of soda,	"
Pyrogalllic acid,	4 oz.
Sulphuric "	1 "
Bromide of potash,	1 "

Solution 1. Dissolve two ounces, by weight, of sulphite of soda in eight measured ounces of soft water, add slowly half a dram of sulphuric acid, and then 240 grains of pyrogalllic acid. Pour in enough water to make eight ounces of mixture. In warm weather fifteen grains of bromide of potassium may be added to prevent too rapid working. This solution is labelled "Pyro." It must be used only so long as it is perfectly clear.

Solution 2. Dissolve one ounce each of carbonate of potash and soda in five ounces of water. Add enough water to make eight ounces.

Each solution should be poured into its bottle through a wad of clean cotton placed in a funnel.

When the developing solution is needed, the two solutions are mixed and diluted, in the proportion of one part of each to two parts of water.

To develop the plate, lay it in one of the trays, face upward, and pour the solution over it with a sweeping motion. Then move the tray so that it will be washed evenly, gently breaking all air-bubbles with the finger-tip. The picture will shortly begin to appear on the plate, the very light parts first (which of course are black in the negative). If the plate is under-exposed, the details of the picture will refuse to appear; if over-exposed, the whole picture will appear suddenly. The negative should be examined by holding it up to the light from time to time, and as soon as the details are distinct enough, the plate is thoroughly washed with a stream of clear water from the rubber tube. If it is known beforehand that a plate is over-exposed, only half the ordinary quantity of the second solution is used, and a few drops of a solution of bromide of potash are added (50 grains to the ounce of water). The bromide makes the process slower, the second solution hastens it; so by varying the proportions, a developer may be made to suit a plate more or less over-exposed.

Fixing. Two solutions are needed for fixing: one composed of one part of alum to ten of water, the other of one part of hyposulphite of soda (called "hypo" for short) to five of water. The trays for fixing should be about two inches deep, and enough solution is placed in each to cover a plate. When the negative has been washed, after developing,

it is placed in the alum solution for four or five minutes, washed again, and then in the "hypo" solution till no whiteness is seen on the plate, looked at from the back. This should take not more than ten minutes; the "hypo" should be renewed if it works slowly. Fixing may be carried on in a weak light, and after it is finished the plates may be exposed to strong light without injury. If the fixing is not thoroughly done, however, the negative will not last. After fixing, the plates are placed in a large pail of water, for several hours, the water being changed every twenty or thirty minutes, and they are then allowed to dry, without being heated.

Varnishing. This is not necessary unless the plates are to be preserved a long time. Prepared varnish (to be bought of a dealer in photographic supplies) is poured on the plate, which is lowered first at one end and then at the other, so that the varnish flows evenly over the surface. The surplus is drained into the bottle from one corner, the plate being rocked to and fro to prevent drying in ridges.

Printing. Paper all ready for printing may be bought, or it may be prepared by soaking albumenized paper in a bath of nitrate of silver, composed as follows:

Water,	64 ounces.
Nitrate of silver,	8 "
Ammonia nitrate,	2 "
Magnesia, "	1 ounce.
Ammonia, one drop to each	ounce of solution.

This solution is used over and over again, adding nitrate of silver and ammonia from time to time. The condition of the solution may be tested by putting enough shot into a glass tube closed at one end to float it upright in a bottle of the liquid. Make a scratch on the tube at the level of the liquid. As the latter gets weaker the tube will sink lower, and enough nitrate of silver

must be added to float the tube at the same level.

The silver solution is poured into a glass tray, or one of shellacked wood, and the sheets of paper floated on it, albumen side down. One corner should touch the surface first, and the rest of the sheet be lowered evenly, so that no air-bubbles may get under it. Light bits of wood are laid on the paper to keep the corners down. The paper should be floated from one minute and a quarter to two minutes (longest in winter), and then pressed between blotting-papers and hung up to dry in the dark. Before printing, the paper, whether ready-prepared or home-made, must be exposed for from fifteen to thirty minutes to the vapor of ammonia, longest in cold weather. This is done most conveniently by hanging the sheet over twine in a box, in the bottom of which is a tray of strong ammonia water.

Printing-frame.

For printing, a frame like that shown in the illustration is usually used. The negative is placed in it film up, and on it is laid the sensitive paper, film down. The two are secured by the springs pressing against the back of the frame, and then exposed to sunlight. The process must be watched carefully, by opening the back of one side of the frame to see how far it has progressed. The print should be much

darker than the finished picture is to be. After printing, the pictures must be washed in clear water, which is changed thrice, letting them remain each time about ten minutes.

Toning. This process changes the color of the print from reddish brown to brownish black. A stock solution should first be made by dissolving 15 grains of chloride of gold and sodium in 15 ounces of water. To make a toning bath for twenty prints, add three ounces of this to 10 ounces of water in which have been dissolved a pinch of cooking-soda and a pinch of common salt. The bath must be kept slightly alkaline, and should be tested with litmus paper (see TEST PAPERS). If it does not turn red litmus paper blue, more soda should be added. The prints are to be toned, about a dozen at a time, by laying them one by one face downward into a tray partially filled with the bath. It should be seen that they do not stick together. The bath should be kept at a temperature of about 70°, which in a cold room may be done by setting the tray on a hot-water bottle. In ten or fifteen minutes the red color of the prints will turn to a purplish or brownish black. If the process is kept up too long they will become slate-colored.

If the prepared silver-paper be used, the following recipe gives better results: Add to the gold solution a solution of cooking soda, drop by drop, till it turns red litmus paper blue. Add 10 grains of acetate of soda and 18 ounces of water.

Fixing the Prints. Soak them fifteen or twenty minutes in a bath formed by dissolving in one gallon of water a pound of hyposulphite of soda and a tablespoonful each of cooking-soda and common salt. The part used should be thrown away. After fixing, the prints should be soaked three or four minutes in strong salt and

water. They should then be thoroughly washed, the water being changed eight or ten times.

Blue Prints. These are made on blue or cyanotype paper (Greek, *cyanos*, blue). The process of printing is as already described, the paper, as manufactured, being all ready to put into the printing-frame with the negative. No toning and fixing is necessary, the print requiring only to be washed in pure water till the drippings cease to be yellowish.

Hydrochloric acid makes the color bluer, and sulphuric acid renders it greenish. A few drops of either are sufficient. Ammonia turns the color to purple and makes it lighter.

The ease of blue printing has made it popular with amateurs, and many use it for taking "proofs" even when they desire to print afterward in the regular way.

Bromide Prints. Bromide of silver-paper is very sensitive, and is used where quickness is sought and for enlargements. The paper is so sensitive that thin negatives are best printed by the light of a kerosene lamp. To enlarge a picture, the negative should be fixed in a hole in the wall in front of a HELIOSTAT, and a lens so placed that a sharp enlarged image of the negative is thrown on the sensitive paper, which is supported on an upright board. No light should enter the room except that which comes through the lens.

The print does not show at first, but requires to be developed, so that it cannot be told directly when the printing is finished, as with an ordinary photograph. The photographer must learn the proper time for exposure in various cases by experience, as in taking the picture.

Bromide prints are developed and fixed as follows: The developer is made by mixing three solutions, which are kept on hand separately.

Solution 1. One pound of oxalate of potash to three pints of hot water.

Add sulphuric acid till it turns blue litmus paper red.

Solution 2. One pound of proto-sulphate of iron to one quart of hot water. Add one-half dram of sulphuric acid.

Solution 3. One dram of bromide of potassium to one quart of water.

Just before developing, mix six ounces of No. 1 and one ounce of No. 2, and use cold. No. 3 is used to restrain the action in over-exposure, but too much of it spoils the print. The developer, when mixed, should be of a clear dark red. If turbid, it is unfit for use. The image appears slowly. When it is done, wash the print several times in a solution of one ounce of citric acid in a quart of water, then rinse in pure water, and finally fix in a solution of three ounces of "hypo" to a pint of water. Fixing takes about ten minutes. Wash the print, place it in the alum bath, and then wash again. Dry by hanging on a line, not between blotters. Bromide prints last much longer than ordinary ones. They may be used for book illustrations, without mounting, by soaking in five ounces of glycerine mixed with twenty-five ounces of water.

Mounting. Before mounting, the print should be trimmed to the desired shape, which is generally done by laying on it a glass or metal form and cutting around the edge. A knife may be used, but specially made cutters, formed of a small wheel, are preferable. The print should be laid, when cutting, on a piece of glass covered with paper. Glass alone dulls the cutter, and wood is too soft.

The prints are secured to the cardboard mounting with paste, which must be very smooth and free from lumps. All air-bubbles must be pressed out from between the print and the card, and no more paste used than is absolutely necessary.

Burnishing. After mounting, the

pictures may be passed through a brusher, like that shown in the picture. The photograph should not be perfectly dry, and should have its face rubbed with fine scrapings of castile soap.

Taking Portraits Indoors. The sitter should be placed obliquely near one window in the room, the light being shut out from all others by white muslin or paper shades. If the shadows are too strong, light should be reflected from the opposite side from a sheet hung over a clothes-horse. The background should be plain and simple.

Hints on Landscapes. A landscape should not be photographed from the shadow side, as it appears too sombre. The best time for taking landscape views is in the morning or early afternoon, but late afternoon is the best time for cloud effects. When a body of water appears in the picture, a point of view should be chosen where the water will not appear as a sheet of white. Distant views are best taken when the air is clear and free from haze or smoke, though a partially cloudy sky gives an excellent light.

Flash-Light. Places which are always too dark to photograph by sunlight may be taken by flash-light. Magnesium "cartridges" to produce this light may be bought of dealers in photographic material. In using them, focus must first be made with the aid of lamp or gas-light. The lens is then capped, the slide drawn, all lights put out, the lens uncapped, and then the cartridge is lighted, making a sudden, short, and brilliant light, which takes the picture. The lens is then recapped and the plate removed.

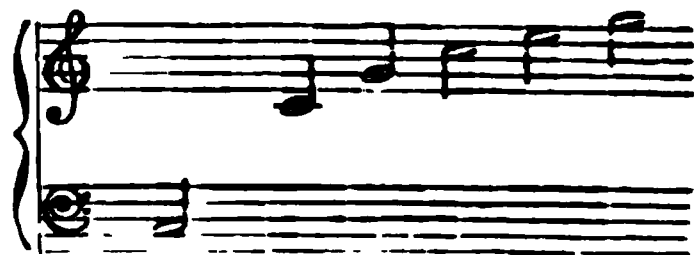
PIANO, Experiments with a. The Piano is described in C. C. T. The following experiments can be performed by any one who understands the elements of music.

1. Place sheets of music on the wires. The notes will now have a rattling sound, and a tune on the piano

will sound somewhat as if played on the banjo.

2. Press down very gently the keys belonging to any desired chord, so as to make little or no sound, and hold them down, while some one brushes the wires gently with some light object, such as a feather or a straw. The chord will be heard very softly, as if played far away. By changing the notes, being careful to press them down so gently as to make no noise, while the feather still sweeps the wires, the player may modulate, or even play a very slow piece of music. The reason is, that ordinarily a damper rests against each wire, which is raised when the corresponding key is pressed; hence the feather causes only those wires to sound which are undampened. The wires must be lightly brushed, as otherwise all of them might sound, in spite of the dampers.

3. Press down one key, gently, as before, and then strike the one an octave below it, very hard, not holding it down. When the sound has been sufficiently dampened, the pressed-down key will be heard sounding clearly. The reason is, that the note struck is composed of several notes, being in fact a chord, and these cause the corresponding wires to vibrate in sympathy. The other notes which will vibrate in like manner are the fifth above the octave, the second octave, and the third and fifth above that. These are called overtones. Thus, if a C in the lower part of the piano be struck, any or all of the following notes will sound, if their keys be first pressed down and held down.



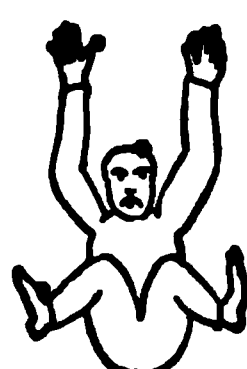
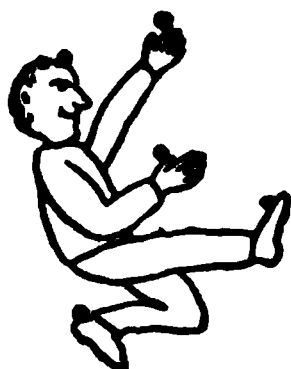
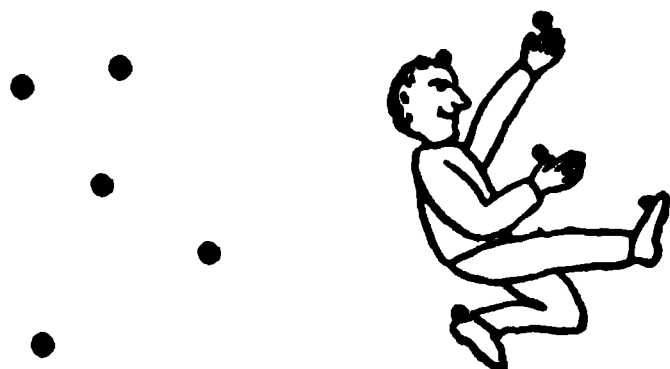
PICKADILL. See FOX AND GEESE, III.

PIGEON FLYING. The carrier pigeon is described in C. C. T. These birds are sometimes matched one against another, just like horses or boats, so that Pigeon Flying has become a sport. The birds are carried away long distances from their homes in baskets, released at the same time and place, and the one that reaches its roost soonest wins the race. The quickest times and longest flights made by pigeons in contests of this kind are given in the Appendix.

PILLOWS AND KEYS, or PILLOW AND KEY, a game played by any number of boys and girls. All sit in a circle, and a boy taking a cushion or pillow, lays it at the feet of any girl he chooses and kneels on it. The girl must kiss him, and then, taking the cushion, places it in like manner before any boy, while the first-named boy takes her seat. Sometimes a rhyme is repeated by the kneeling player, for instance

"Had I as many eyes as stars in the skies,
And were I as old as Adam,
I'd fall on my knees, and kiss whom I please,
Your humble servant, madam."

This game is said to be derived



Pin Drawings.

be made. The illustration shows the spots where the pins or rice are supposed to have fallen, and three different figures drawn from these spots.

PINOCLE. See BÉZIQUE.

PIQUET, a game of CARDS played by two persons with a EUCHRE pack. The players cut for deal, and highest deals, Ace being high in cutting, as in playing, and the other cards ranking as in WHIST. The dealer gives twelve cards to each

from an old dance called the "Cushion Dance."

PIN DRAWINGS, a game played by any number of persons, with pencil and paper. Sheets of paper, one for each player, are laid in a pile, and five pins are held about three feet above them, between the thumb and forefinger of the leader, who drops them on the paper. At the spot where each of the pin-heads lies, another pin is then driven through all the thicknesses of paper, so that pin-holes are made in each, in the same positions. Each player must now draw on his paper a human figure, so that one pin-hole is included in the outline of the head, and one in that of each hand and foot. Animals or birds may be drawn instead, varying the number of pin-holes and the requirements of the game to suit the players. At the close of the drawing, each player should write under each picture the name of the one he supposes to have been the artist. Sometimes grains of rice are dropped on the paper instead of pins, to show where the head, hands, and feet of the figure must

player, two at a time, and places the stock where both can reach it. If the hand of either player contains no face card, it is called *carte blanche* (white card), and he scores 10 at once. He must deal the cards on the table quickly, one by one, and then take them up again that his opponent may see he has no face card. The non-dealer may now discard five cards, or less, supplying their places by an equal number from the top of the stock. He

must discard at least one. If he discards less than five, he must tell how many, and may then look at those of the upper five cards of the stock that he did not take. Thus, if he discard two, he takes two from the stock, and may look at the next three. The dealer need not discard at all, unless he wishes; but he is entitled to all the cards that are left in the stock, or as many of them as he wants, and discards as many as he takes. He must take his cards from the top of the stock as they come, even if they have already been looked at. In every case the discard must be decided on and made before any cards in the stock are taken up.

Discarding is followed by what is named "calling and showing," in which the players see which has the highest of certain groups of cards. These groups are of three kinds: 1. Points; 2. Sequences; 3. Quatorzes and Trios.

Point is won by the player who has the greatest number of spots in any one suit, reckoning Ace as 11, and face cards each as 10. He who wins *Point* scores one for each card in the suit.

Sequences (Latin, *sequens*, following) are three or more cards of the same suit in regular order. They rank: first, according to the number of cards, and second, according to the highest card in the sequence. Thus, a sequence of five cards is always higher than one of four; but of two sequences of four,—King, Queen, Knave, Ten, for instance, is higher than Queen, Knave, Ten, Nine. Sequences count one for each card, and 10 points more if there are five or more cards; thus, a sequence of three counts 3, but one of seven counts 17. The holder of the highest sequence scores for all the sequences he holds, but the other scores for none of his. The sequences are often given French names, being called respectively

tierce, quart, quint, sixième, septième, and huitième, according as they consist of three, four, five, six, seven, or eight cards. A sequence whose highest card is Knave or King, for instance, is called a "sequence to a Knave" or "to a King;" thus, a Queen, Knave, and Ten of the same suit form a "tierce to a Queen." If Ace is the highest card, it is a sequence major (Latin, *major*, greater, because it is greater than any other sequence of the same number of cards).

Quatorzes and Trios are four cards or three cards of a kind, higher than a Nine-spot, and are called simply four Queens, three Aces, or whatever they may be. The value depends on that of the cards that form the group, but any Quatorze is higher than any Trio. A Quatorze counts 14, and hence its name, which is the French for fourteen. A Trio counts 3. The holder of the highest Quatorze (or Trio, if there be no Quatorze) scores for all his Quatorzes and Trios, but the other player scores for none of his.

The scoring of all these groups proceeds as follows: The non-dealer calls the amount of his *Point* (the sum of the spots of his highest suit, as explained above). If the other have nothing greater, he says "Good," and the winner shows all the cards of his winning suit; but if the other has the same, he says "Equal," and neither scores; if he has a suit that will beat it, he says "Not good." If he says "Equal," or "Not good," he neither shows his own cards nor scores till his opponent has led the first card, as shown below. The sequences are then taken up in like manner, the elder hand telling what his highest is, and the other replying "Good," "Equal," or "Not good," as before. Lastly the Quatorzes and Trios are considered together.

Playing now begins, the eldest hand leading first, and the winner of

each trick leading for the next, as in most card games. Suit must be followed if possible, otherwise any card may be played. Any one that leads a "counting-card" (Ace, King, Queen, Knave, or Ten) scores one, whether he takes the trick or not; and he who takes a trick with a counting-card likewise scores one. He who takes the last trick scores an additional one (thus he scores two if he takes it with a counting-card). The player that takes the majority of tricks scores 10 for cards. If he take every trick (called winning a Capot), he scores 40. If each takes six tricks, neither scores for cards.

If a player score 30 in hand and play before his opponent scores anything, he wins *Pique*, and scores an extra 30. If he score 30 in hand alone before his opponent scores, he wins *Repique*, and scores an additional 60. Carte Blanche counts toward a Pique or Repique, but a Capot does not.

The game is 100. It is customary not to write down the score till the end of the hand. Before that time, each player, as he wins a point, adds it mentally to his previous score for that hand only, and announces the total aloud. But as the whole score nears 100, it is necessary to remember what it is, as the game ceases as soon as either player's score reaches that amount.

It must be remembered that although the dealer does not show and score his winning groups till the first card is led, they are looked upon as if they had been recorded in their proper place, in counting for Pique and Repique. Thus, if the elder hand scores 30 by his Sequences and Quatorzes, while his Point is "not good," he does not repique the dealer, whose score is regarded as being made in its proper place, though he is not obliged to show his winning suit till later.

In playing Piquet the chief things for the beginner to note are:

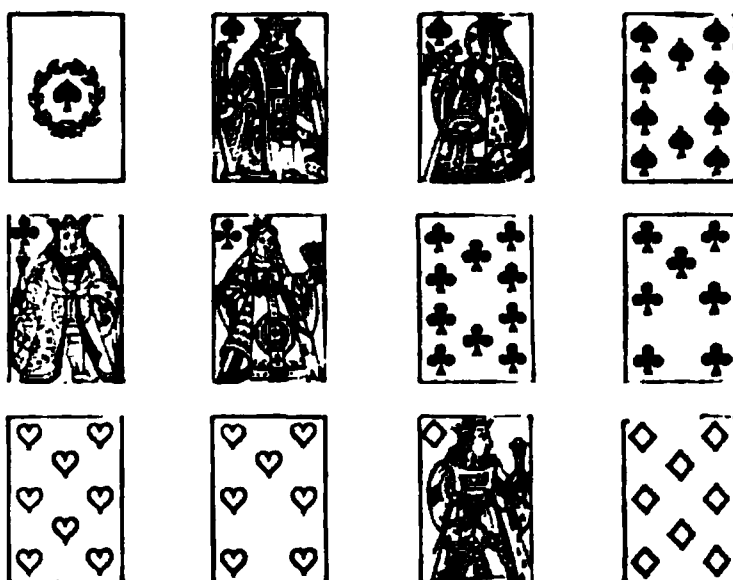
1. That the discarded cards and the ones shown by his opponent, together with those in his own hand, give him the means of making a good estimate of his enemy's strength.

2. That in discarding, all of a long suit should usually be kept to make Point.

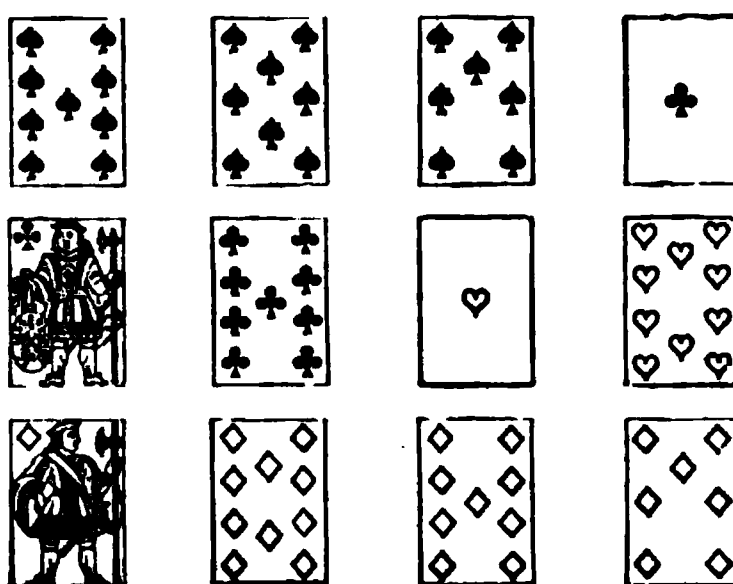
3. That as the elder hand leads and there is no trump, he can play a bolder game than his opponent, and need not keep small cards to guard a King or Queen, as his opponent should. An experienced player will often omit to call his best groups, preferring to lose, for the time being, rather than give his opponent valuable information. The learner is advised to play through carefully the following sample hand.

A deals.

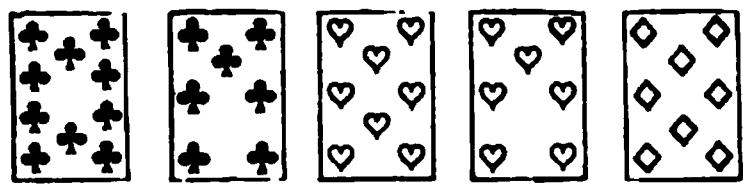
B's hand is:



A's hand is:

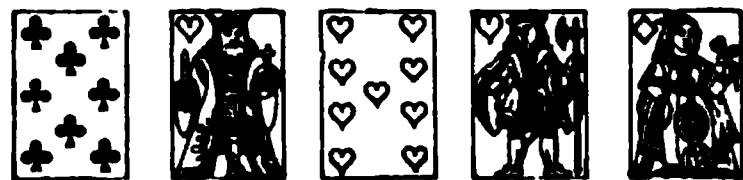


B discards :

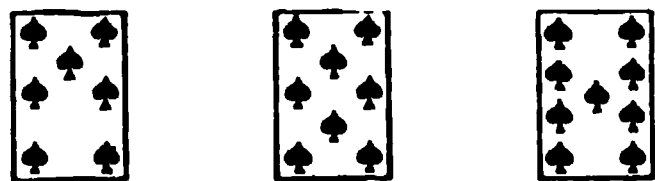


(He keeps his longest suit, Spades, for Point, and discards the small cards of the other suits, as by so doing he breaks up no sequence, Quatorze, or Trio. He does not keep the Eight of Diamonds as a guard to his King, since he has the lead.)

B draws :



A discards :



and draws :



B (calling his Point) says "Forty-one."

A (seeing he has 47 in Diamonds) replies "Not good."

B says "A Tierce Major."

A says "Good" (since he has no higher sequence), and B shows



and says "3" (scoring).

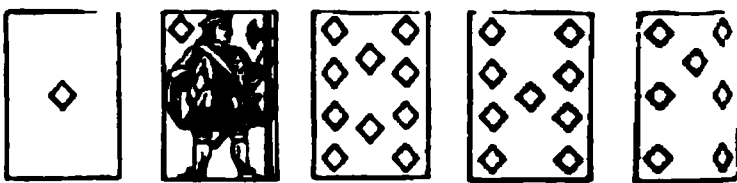
B says "Four Kings."

A says "Good."

B (who need not show them unless A demands it) says "17, and three Queens make 20."

B plays  and says "21."

A now shows his Point :



saying "5."

A plays . (1st trick.)

B plays , saying "22."

A plays . (2d trick.)

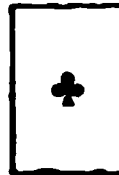
B plays , saying "23."

A plays . (3d trick.)


B plays , saying "24."

A plays . (4th trick.)

B plays , saying "25."

A plays , saying "6." (5th trick).

A (who has thus gained the lead)

plays , saying "7."


B plays . (6th trick.)

A plays  , saying "8."

B plays  . (7th trick.)

A plays  , saying "9."

B plays  , saying "26." (8th trick.)

B (leading again) plays  ,
saying "27."

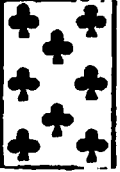
A plays  . (9th trick.)


B plays  , saying "28."

A plays  . (10th trick.)

B plays  , saying "29."

A plays  . (11th trick.)

B plays  (which does not
count, as it is not a "counting card.")

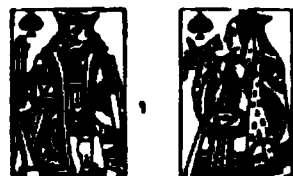
A plays  , and B, counting
one for last trick, says "30."

B has taken the majority of tricks,
so he has "cards," which counts 10,

and his score stands 40 to A's 9 for the hand.

In playing, where a person sees that he is sure to take tricks with more than one card in a suit, he generally lays them down all at once to save time. So, in the above game, beginning after the first trick, B

might put down his



and  , together saying "24,"

for the Knave has just been played, and they are therefore the three highest cards in the suit.

Three-handed Piquet. The dealer gives each player eight cards. The eldest hand can take four cards, the next player two, with any left by the first, and the third as many as remain. Points, etc., to be "good," must be in excess of those held by each of the other players, but they score as in two-handed Piquet. A Pique usually scores 20 extra points, a Repique 40, and a Capot 30, but there are several other modes of scoring these chances.

Other Kinds of Piquet. Several varieties of the game, differing from the standard Piquet in some minor particulars, are played in Europe. For instance, in Portland Club Piquet, introduced in 1873, the Point is not always estimated simply by counting one for every card held in it; but if its pips happen to amount to 34, 44, 54, or 64, the Point counts as 3, 4, 5, or 6 points respectively. In these cases the Point scores one less than it ordinarily would.

RULES OF THE GAME.

1. If there be a misdeal, or the dealer expose one of his opponent's cards, he must deal again; but if only one card be dealt wrongly (as when one player has thirteen and the other eleven, or when one has

thirteen and there are only seven in the stock) the non-dealer may let the deal stand, if he choose, and the numbers shall be corrected in discarding.

2. If the elder hand have Carte Blanche, he must announce it at once, but need not show it till after the discard. If the dealer have it, he need neither declare nor show it till his opponent has discarded.

3. After a player has touched the stock he cannot alter his discard unless there has been a misdeal, or the other player wrongly announces the number of cards he takes, or fails to announce it.

4. If a player take more cards from the stock than he ought, he must play the hand through, but only his opponent may score. If he take less than his due, his opponent may reckon, as tricks won, all cards that cannot be played to.

5. The elder hand may look at any cards that he declines to take from the stock. The dealer may look at what he leaves, after the other has led a card; but if he does so, his opponent may also look.

6. A player may examine his own discard at any time.

6. If a player call a lower group than the highest he holds, he must abide by his call; but if he call a group he does not hold he must correct his mistake.

8. When the elder hand has led, or the younger played to it, neither can reckon anything that has been omitted.

9. A player may at any time require his opponent to show him all unplayed cards that have already been shown in reckoning, or may ask for any information about such cards.

10. A card once played cannot be taken up unless it has been led out of turn and the adversary has not played to it, or unless it is a revoke. In the latter case all cards played after the revoke are taken again into

the player's hands and played over again.

11. Both players' tricks may be examined by either at any time.

12. Errors in adding or marking the score may be made right at any time during the game.

Imperial, a kind of Piquet, in which a trump is turned. The King is the highest card in the pack, and the Ace ranks between the Knave and the Ten. The face-cards, the Ace, and the Seven, are called Honors. There is no discarding. The top card of the stock is turned for trump, and this trump-card is treated as part of each player's hand in reckoning Point and groups of cards. Of the Piquet groups, the only ones that count in Imperial are quarts-major and groups of four Honors, both of which are called Imperials. Each player scores for whatever Imperials he has, but Point is scored only by the holder of the highest, as in Piquet. The elder hand first shows and scores his Imperials, and then calls his Point. Before replying to the call, the younger shows and scores his Imperials, and then says "Good" or "Not good" to the call of Point. If good, the elder shows and scores it; if not, the younger waits till after the lead before doing so, as in Piquet. If either have Carte Blanche, only that and Imperials are scored; there is no Point, and the hand is not played. In playing, only Honors are scored for, and always by him who takes the trick containing them.

In scoring, an Honor turned up counts the dealer one; Carte Blanche scores 12; an Imperial scores 6; Point scores 1. Each Honor won in play counts one. Each trick taken more than six counts one. When a player's score is six, no matter how gained, he is said to have scored an Imperial. When, in the course of a hand, either player's score amounts to that of one or more Imperials, his opponent's score

is reduced to the next lowest whole number of Imperials, called "taking down." Thus, suppose A has 4 points and B 3; if B make 3 more, all A's are taken away, and the score is 1 Imperial to nothing in B's favor. Similarly, if A have 25 points and B 4, and B gain 2, the score is A, 4 Imperials; B, 1 Imperial. But if each player has one or more Imperials in hand, neither takes down his score. The number of Imperials that shall win the game is decided on beforehand. It is usually about six (36 points).

In playing, the most noticeable difference from Piquet is due to the trump. Trumps should be led if the hand is strong in them (that is, if there are four or more). If a player is forced to trump, he should do so with a low Honor, to score it. If a player think, from the score, that he can make an Imperial, and that his adversary cannot, he should try to force the latter to make necessary points before the Imperial is scored, that it may take them down. This is called "playing to the score."

RULES OF THE GAME.

1. If the dealer turn the wrong card, or more than one card, for trump, he must show his hand to his opponent, who, without looking at his own hand, may either require the right card to be turned, or call for a new deal.

2. If a player look at any of the stock cards, his adversary may call for a fresh deal, if he have not seen his own cards. If he have seen them, he may call on the offender once during the hand to lead some particular suit.

3. All Imperials must be shown before they can be scored. If a player do not show his Imperials at the proper time, as described above, he cannot score them.

In other essential points, the laws of Imperial are the same as those of ordinary Piquet.

History. Piquet is one of the oldest of the card games still played. It is generally supposed that it originated in France, where it was also called *Cent* (Hundred), though the same game under the name of *Cientos* was early known in Spain. It was called *Sant* (corrupted from *Cent*) in England till the middle of the seventeenth century, when the French name of Piquet was adopted. What is now called the Point in Piquet was known in old times in France as *Ronfle*, and some writers think that the game was developed from the old Italian *Ronfa*. Others think that it may have been derived from the Saxon game of *Schwerter Karte* (Sword Cards), which would account for the name, the French *Pique* (pike) as a suit mark being the same as the Spanish *Espada* (Sword). Some French writers say that Piquet was so named after a man who invented it; others say that it was named from the Pique, one of its features, but without explaining the latter; while still others suggest that the name means "*Le jeu piquant*" (The exciting game). The word is also written Picquet, and in English Picket.

PITCH. See ALL FOURS.

PITCHETTE. See GROMMETS.

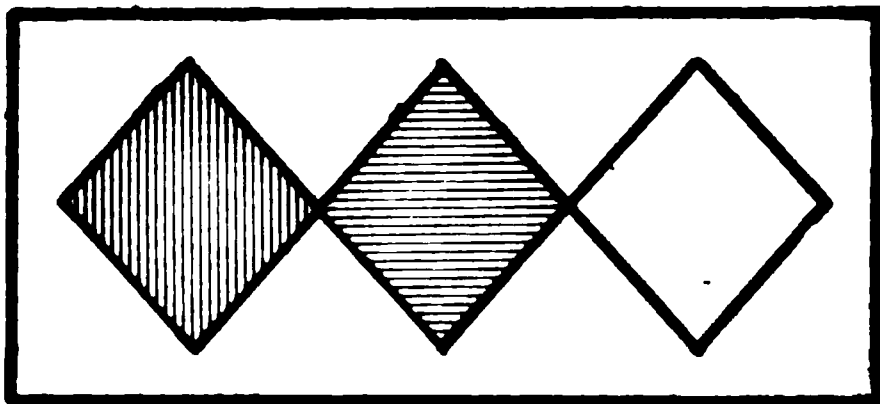
PLANETS. *Observations on.* The planets are described in C. C. T. in the article UNIVERSE. The only ones about which anything more can be seen with an opera glass than with the naked eye are Venus and Jupiter. Planets constantly change position in the heavens, so that no directions can be given for finding them to one who has not studied astronomy. The best way is to wait until one of them is morning or evening star, which can be seen by any almanac.

Venus. It can be seen through an opera-glass that Venus has phases like the moon, changing from a thin crescent to a full disk, and then back again to a crescent; but instead of being repeated every month, as with

the moon, these changes take nearly nineteen months. When Venus is full she is nearly eight times as far away from the earth as when she is new, so her apparent changes of size and shape are quite apparent.

Jupiter. This planet has four moons, which are invisible to the naked eye, but can be seen through an opera-glass. They always appear in a straight line, and change position very rapidly. If they are looked at two nights in succession, this change of position enables the observer to tell them from stars, which they resemble.

PLANK, a game played by two to four persons, with 12 cards and 24 counters. Each of the cards bears three squares, arranged as in the figure, and colored red, white, and blue, the order of the colors varying on different cards.



Plank-card.

The counters are divided into four sets, marked respectively with the letters A, B, C, and D, and in each set there are two red, two blue, and two white counters. The cards are divided equally among the players, and each is given a set of counters. The player at the dealer's left lays down a card face upward, and places a counter on a square of the same color. The player at his left may place a counter on the same card, or lay another card close by its side, placing a counter on the second card, and the other players in turn have the same choice. When the cards and counters have all been played, each may move one of his counters to a vacant space of the same color.

He who first gets three of his counters, red, white, and blue, in a row, either lengthwise or across the cards, wins the game. No counter may be placed on a square of a different color.

PLANTING, a game played by any number of persons, in which each in order tells what he has planted and what came up. The articles planted may be objects or persons of any kind, but they must come up as plants or trees, having some punning connection with the thing planted. Thus, one player may say: "I planted Shakespeare, and Sweet William came up;" another, "I planted a pack of cards, and W(h)istaria came up."

PLATINUM, Experiments with. 1. Heat a bit of platinum wire red-hot in the flame of a Bunsen burner. Turn off the gas, and turn it on again at once. The wire will remain red-hot, though it does not light the gas again. The reason is, that platinum condenses gases on its surface, and the mixed gas and air of the burner being thus condensed, unite and give out enough heat to keep the wire red-hot, though not enough to light the gas again.

2. Cut a star, or any other figure, from a piece of platinum, and suspend it by a platinum wire in a wine-glass by fastening the wire to a nail laid across the top of the glass. Put a little alcohol into the glass, about a quarter of an inch from the object, light it, and when the platinum is red-hot, smother the flame by placing a piece of paper or card-board on the top of the glass. By lifting the cover now and then to let air into the glass, the platinum figure will remain red-hot and throw out a bright light, until all the alcohol is exhausted. The effect is very beautiful in a dark room.

POETICAL BUTTERFLY, THE. A game played by any number of persons, one of whom, called the But-

terfly, names the others after trees, flowers, birds, or insects. The Butterfly pretends to fly from one to another, asking each for his story, and then commenting on it as he pleases. Each of the players, when thus addressed, must give some quotation, or mention some tale or legend, about the tree, flower, bird, or insect he represents. Thus, the Apple-tree may allude to the story of William Tell, and the Robin to that of Cock Robin, while the Black-bird may quote:

✓ "Four and twenty blackbirds
Baked in a pie."

POETS, a game played by any number of persons, with pencils and paper. Each writes on a slip of paper the name of some well-known author, and on another slip a quotation from his works. The names are then placed in one pile, and the quotations in another, and each player draws a slip from each pile. Each, in order, then reads his slips aloud, and declares whether or not the quotation drawn is from the writings of the author. If not, he is required to give a quotation from the writings of the author whose name is on his slip, and to name the author of the quotation on the other slip. If he makes any mistake he must pay a forfeit. Another way of playing the game, which makes it entirely one of chance, is simply to exact a forfeit from those players who draw slips on which the names and quotations do not correspond. This game is called in Germany *Dichter Erraschen* (Guessing Poets).

POLISH CHECKERS or DRAUGHTS. See CHECKERS.

POKER, Experiment with. Heat a poker red hot, and then look along its side at an object ten or twelve feet distant. If the poker is held correctly, three images of the object will be seen close to the surface, one of which is upside down. These images are caused by reflection from the heated air close to the

poker. A similar reflection from the air close to the hot sand of a desert is called Mirage (a French word meaning reflection).

POLO, the game of HOCKEY played on horseback or roller skates. In the horseback game, called Equestrian Polo, the players ride on ponies not more than 14 hands 1 inch in height, usually Mexican Mustangs. The sticks, or mallets, are from 49 to 52 inches long, with heads of willow-wood and flexible handles covered with buckskin. The balls are made of light wood. The grounds are about 750 yards long and 500 feet wide, and have at each end two goal-posts, 24 feet apart. At the beginning of the game the leaders toss for goals, and the players on each side take position in front of their goal behind a line drawn about 12 yards from it. The ball is thrown into the centre of the field by the umpire, and the game begins. Sometimes the game is opened by "charging," in which case the players stand only a few feet from the ball, and rush upon it at the word "play;" but as this is hard on the horses, it is usually omitted, except in the opening game of a match. The object of the game, as in similar ones, is to strike the ball between the opposing goal-posts, called winning a goal. A match game usually consists of three innings of twenty minutes each, with two minute intervals for rest, and the side making the most goals in the sixty minutes of play wins the game. In case of a tie, the game is continued till one party makes another goal.

RULES OF THE GAME.

The following are the rules of the Westchester Polo Club:

1. The grounds to be about 750 feet long by 500 feet wide, with a ten-inch guard from end to end on the sides only.

2. The height of the ponies must not exceed 14 hands 1 inch.

3. The balls to be of wood, with no other covering than paint, and about 3 inches in diameter. The mallets to be such as are approved by the Steward.

4. The goal-posts to be 24 feet apart, and light enough to break if collided with.

5. Match games between pairs shall be for periods of 30 minutes, time between goals included, unless otherwise specified.

6. Match games between teams of four shall be three periods of 20 minutes each, actual play, time between goals and delays not counted, with 10 minutes between the periods for rest, unless otherwise specified.

7. Each team to choose an umpire, and, if necessary, the two umpires to appoint a referee, whose decision shall be final.

8. Each team shall have a substitute in readiness to play when a match is on.

9. There shall be a captain for each team, who shall have the direction of positions and plays of his men.

10. No captain shall allow a member of his team to appear in the game otherwise than in the Club uniform.

11. No person—players, umpires, and referee excepted—shall, under any circumstances, be allowed upon the ground during the progress of the game.

12. It is forbidden to touch an adversary, his pony, or his mallet, with the hand or mallet during play, or to strike the ball when dismounted.

13. The game to begin with a charge, the contestants taking their positions behind the chalk-line, which is to be 30 feet from the goal-posts. When the signal to charge has been given by the referee, the first and second players must keep to the left of the ball until it has been touched.

14. In case of an accident to a player or pony, or for any other reasonable cause, the referee may

stop the game, and the time so lost shall not be counted. When the game is resumed, the ball shall be thrown between the players, who shall be lined up at the point at which the ball stopped. But if the game is stopped on account of a foul, the ball is to be thrown in at the place at which the foul occurred.

15. When the limit of time has expired, the game must continue until the ball goes out of bounds, and such over-time shall not be counted.

16. In case of an equal number of goals having been made at the end of the third period, the game to be continued until one side makes the winning goal.

17. When the ball goes out of bounds at the sides, it must be thrown in from the place at which it went out, by the referee, or by an impartial person, between the two sides, which shall be drawn up in line facing each other. When the ball goes out at the ends, the side defending that goal is entitled to a knock-out from the point at which it crossed the line. When the player having the knock-out causes unnecessary delay, the umpire may throw a ball on the field and call plays. No opponent shall come within 50 feet of a player having the knock-out, until the ball has been hit.

18. A player requiring a mallet during the game, must ride to the end or side line. It must not be brought on the field to him.

19. Foul riding is careless and dangerous horsemanship, and lack of consideration for the safety of others. A player in possession of the ball has the right of way, and no one shall cross him unless at such a distance as to avoid all possibility of a collision.

20. The referee may suspend a player for the match for foul riding, or he may award the opposing side a half goal.

Polo on Roller Skates, or Rink Polo, a game played by opposing

teams of five players in a rink or other large hall. The ball is of rubber, and the sticks, which are curved at the end, are about five feet long and one inch in diameter. The goals, set ten feet from the ends of the rink, are cages six feet wide, three feet deep, and three feet high, and to count as a goal, the ball must be struck into the cage and remain there.

RULES OF THE GAME.

1. To start the game, the ball is placed in the middle of a straight line joining the centres of the goals, and at the whistle of the referee is charged upon by a player on each side, who shall start, without aid, from a point on a line with his goal and 18 inches to the left of it.

2. The side scoring most goals in a half hour's play wins the game.

3. To count as a goal, the ball must remain in the cage. It must not be removed thence by any person but the referee. Should any player touch the ball in the cage either with his person or stick, or anything else that indicates his intention to remove the ball, the referee shall decide a goal for the other side.

If a ball go out of bounds, the referee shall blow his whistle to call game, and place the ball at a point opposite where it went out, at least four feet from the rail. In recommencing play, the players who do so must stand in position to knock the ball up or down, not across, the rink with their backs toward the sides, the ball to be midway between two players.

5. Game shall be called by the referee whenever a foul occurs, or whenever one is claimed, unless the referee is satisfied that no just claim exists. Upon claim of foul, if game is to be renewed, the ball must be placed where the foul occurred.

6. It shall be deemed a foul: 1. If any player stop or strike the ball when any part of his person is

touching the surface. 2. If any player catch or bat the ball with his hands or arm. 3. If any player (save the goal-tend, who may do so) kick the ball with his foot or skate, though he may stop the ball with either. 4. If any player strike down the stick of his opponent, or if any player trip or strike another intentionally with stick, hand, or skate. 5. If any player throw his stick in the pathway of a player or at a ball. 6. If a player raise his stick above his hip in striking a ball. But in case the ball is in the air, above the hip, he can raise his stick to stop it.

7. Any act by any player that is manifestly intended as an interference with another may be declared a foul by the referee, upon complaint of the captain of the offended side.

8. Three fouls (other than when the ball leaves the bounds) made by either side during a contest for a goal, shall constitute a goal for the opposite side.

9. If the referee decide that a foul made by the goal-tend prevented a goal, one shall be adjudged for the opposite team.

10. All games shall be played on rink skates with plain boxwood revolving rollers, without the use of additional appliances to hinder the free running of such rollers. Any woods, rubber, or any other material attached in any manner to any skate, shoe, or boot, is positively prohibited.

11. The ball must not be struck hard, but may only be "nursed" or "coached."

12. No person, except the players and referee, shall be allowed on any part of the surface during a game.

13. If the rusher, whose place it is to charge upon the ball to start the game, tries to start before the whistle is blown, or does not start from the designated spot, the referee must warn him once; and if he persists, the referee has the

authority to call for a new rusher to start the game.

Parlor Polo Board.

Parlor Polo, a game founded on Polo, played by two persons on a board like that in the illustration. The squares are colored alternately white and blue, except those occupied by men at the beginning of the game, which are red. Each player has six pieces or men, like CHECKERS, called Goal Tend, Cover Point, two Rushers, and two Half Backs, whose positions at the opening of the game are shown in the figure. A small figure of a polo player on horseback, called the Ball, is placed in the middle of the board. Each player sits behind his own goal, and each plays in turn, throwing two dice to determine his moves. The colored squares alone are used. Any man may be moved a number of colored squares equal to the sum of the numbers thrown, diagonally in any direction, either in a straight or zig-zag line, provided he does not pass over any other man in so doing, nor retrace his steps in the same move. The Rushers must move first, and the Goal Tend must not leave the goal; but aside from this the men are all alike. When a man moves exactly into the square occupied by the Ball, he is said to "have the Ball," and it is placed on

him. He can now take the Ball with him in his moves (called "carrying" it), or he may "throw" it, that is, move the Ball like a man. The thrown Ball can pass over the heads of as many men as necessary, but it can be thrown only in a straight line. A player may take the number on one of his dice as a move, with or without the ball, and the other as a "throw," but he can divide them in no other way. Thus, if he throw six-three, he can move up six squares and throw the Ball three, or *vice versa*, but he cannot, for instance, move seven squares and throw two. He wins who first plays the Ball, either by throwing or carrying it to one of the squares in the opposite goal. The Ball should usually be carried as far as possible, and then thrown over the heads of the opponent's men.

History. Polo has been traced back as far as the 8th century, when it was played in Persia and called *Chugdn*, the name of the long-handled mallet used in the game. There is a story that Darius sent Alexander a ball and *Chugdn*, as an insulting hint that he was more fit to play polo than to go to war. It is undoubtedly the equestrian game called "Tennis" in the Arabian Nights. The Byzantine Greeks played it with a stick somewhat like a LACROSSE stick, having at the end a network of gut strings. The game was played both on foot and on horseback. The foot game (our Hockey) was carried to France under the name of *Chicane* (probably a corruption of *Chugdn*) and from this we get our word chicanery, meaning trickery, from the tricks employed in the game. Equestrian Polo was introduced into England by some cavalry officers about 1865, and the first game was played near Folkestone. There are now many Polo clubs in Great Britain and several in the United States. The first club in this country was the Westchester, which played on the

grounds at Fifth Avenue and 110th Street, New York City, still known as the Polo Grounds, though they are not now used for the purpose, the club having removed its headquarters to Newport, Rhode Island, where frequent matches are played every summer. A kind of Polo has long been played by the Indians of Arizona, who use any kind of a stick they wish, and strike to and fro any object, as a stone or piece of wood. There are no sides, each player acting for himself.

POOL. See BILLIARDS.

POPE JOAN. See NEWMARKET.

POP-GUN, a toy gun worked by compressed air. The simplest kind is the Potato Pop-gun, which is made as follows: Fit loosely to a piece of goose-quill about three inches long, cut off squarely at the ends, a wooden piston or ramrod.



Cut a raw potato into slices about as thick as a silver dollar, and press each end of the quill on a slice, so that both ends will be plugged with little pellets of potato (*p*). If one of these be now pushed in with the piston (*s*), the other will fly out with a popping noise. The air within is first compressed and then, expanding, drives out the bit of potato before it. The remaining piece is now pushed forward to the end of the quill, the vacant end pressed again on a slice of potato, and the gun is ready to be fired once more.

A larger gun can be made of a tube of brass or glass, with a piston made by winding twine around the end of a stick till it will exactly fit the bore. A cork is inserted at one end of the tube and driven out by suddenly pushing the piston in at the other. Pop-guns of all kinds are sold at toy shops. In one

kind the piston is in the middle, and there is a cork at each end, so that it can be fired either by pulling or by pushing the piston. In another, a piece of paper fastened tightly over one end is broken by the force of the compressed air.

POROSITY, Experiment on. Porous substances are those which are filled with minute holes, or pores. Half fill a glass with boiling water, and lay over the top a piece of pasteboard, over which invert an empty dry glass. The moist vapor arising from the water will soon be seen also in the upper glass, having passed through the pasteboard. In this way many kinds of substances may be tried: wood, cloth, India-rubber, glass, etc., and it will be found that some of them are porous enough to let water vapor through them, while others are not.

PORTRAITS, a game played with pen, ink, and paper by any number

Autograph Portrait.

of persons. Each writes his name on a slip of paper, with as many

flourishes, and as much ink, as possible. Each then folds his paper once, the fold running lengthwise through the middle of the name, and passes it to the right. The person who receives it presses his

E finger on the fold at **A**, then draws it from **B** to **C**, from **B** to **E**, and from **C** to **D**. He thus makes a series of blots within, and when the paper is unfolded, a rude and comical resemblance to a human figure will be found. This is supposed to be the portrait of him whose name was written on the paper. As a general thing, the more ink used in writing, the more amusing will be the portrait.

The picture shows an "autograph portrait" thus taken. The game is sometimes called "Smudgeography."

PORTRAITS AND SENTIMENTS,
a game played by any number of persons, who sit in a row. Each whispers to his right-hand neighbor the name of some person, and to his left-hand neighbor some sentiment, original or quoted, supposed to be written under the portrait of that person. Each then announces aloud whose portrait has been presented to him, and what is inscribed under it. For instance, a player may be given the portrait of Bluebeard with the inscription: "He was an indulgent husband, and an estimable gentleman." The names chosen may be those of the players, or those of famous characters, real or fictitious, ancient or modern.

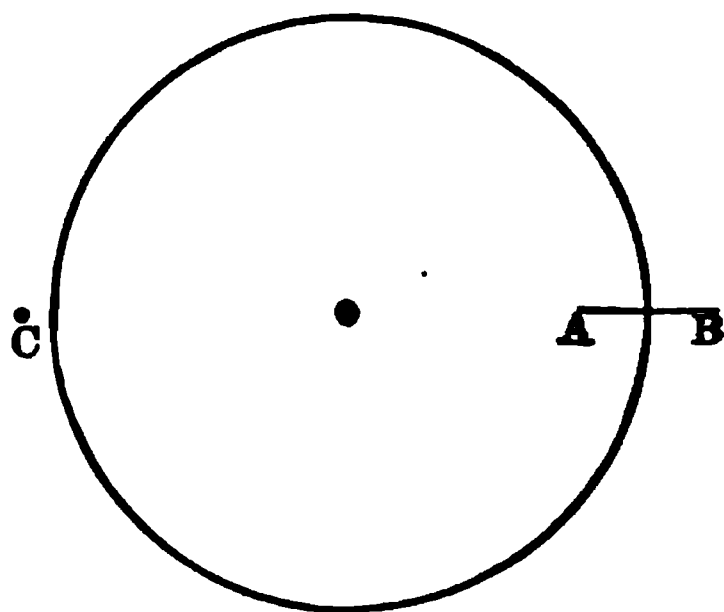
POTASSIUM, Experiments with.
Potassium is described in C. C. T.
1. Throw a piece of potassium on
water as described in C. C. T.

2. Throw a piece on a large sheet of blotting-paper which has been wet with red litmus water (see TEST-PAPERS). The potassium will run about the paper, leaving a blue track caused by the formation of potash (see C. C. T.)

3. In a block of ice about six inches square, bore a hole half an inch wide and two inches deep, enlarging the bottom of the hole to form a cavity. Drop into it a piece of potassium the size of a pea. It will take fire and burn beautifully. The experiment should be tried in a warm, dark room.

4. *To Fire a Cannon with an Icicle.* Load a toy cannon, and on the gun-powder on the touch-hole put a piece of potassium as big as a pin-head. When this is touched with a piece of ice it will blaze up, setting fire to the powder.

POTATO RACE, a running game played by any number of persons. A circle about forty feet in diameter is marked out as a race-course, and across it at any point is marked a straight line A B ten feet



Course for Potato Race.

long, half outside the ring and half inside. On this line spots are marked at intervals of six inches. Each contestant must take a potato from a basket placed near the ring at C, opposite the line, and running around the circle place it on the first spot on the line. As he goes on past the basket he takes another potato, which he places on the second spot, and so on till ten minutes have passed. After placing each potato the runner must return to the ring without stepping over the line, and each potato must be placed exactly on its proper spot. Three

judges are appointed, one of whom stands at the potato basket, one at the line, and one in the middle of the circle to call out the runners' names in order and keep the time.

Any runner who takes more than one potato, or fails to take any, who skips a spot, or does not place his potato properly, is declared out of the race at once. Instead of potatoes, apples, or any small objects can be used. The course and line may be marked with lime or flour on grass, and the spots for the potatoes with dark earth, or by short cross-lines.

POUND PARTY, an entertainment to which each guest is required to bring something weighing exactly a pound. These may be eatables, toys, useful articles, or whatever the giver pleases. Each package is numbered and laid aside as it is received. When the guests are ready for the distribution of the parcels, numbered cards, or slips of paper, are passed around and each draws one. Some one then takes the packages one by one, calling its number aloud; the holder of the corresponding number becomes its owner, and must open it in the presence of the company.

PREDICAMENTS. See **CROSS QUESTIONS.**

PREFERENCE, or SWEDISH WHIST, a game of **CARDS**, played with a full pack, generally by four persons, but sometimes by five or six. The four-handed game will be described first. The pack being placed face downward on the table, each player draws a card from it. The holders of the highest two play together as partners, the other two playing against them. The one who draws the lowest card is allowed to select his place at the table, and deals first. Ace is considered the lowest card in thus drawing, but in playing the cards rank as in **WHIST**. The game resembles ordinary Whist, but differs in the following points: The trump is determined by bidding

thus: the eldest hand names the suit he prefers, and then the others, in order, to the left; but each must name a suit higher in rank than the preceding player, or say "I pass." Hearts ranks as the highest suit, and after it, in order, Diamonds, Spades, and Clubs. The highest suit bid is taken for trump, unless some one bids "Preference," or says "I Prefer," when the game must be played without any trump. Preference is higher than any other bid, and as soon as it is bid, play begins at once.

In practice, the bids of Clubs and Spades are now used as an invitation to the player's partner to demand Preference, Spades being the stronger invitation. If all pass, the party may agree to play "Millissimo," the object then being to avoid taking tricks. Honors and tricks are scored as in Whist, but the score is multiplied by 3, if Clubs are trumps; by 4, if Spades; by 5, if Diamonds; by 6, if Hearts; and by 8, if Preference or Millissimo has been played. In the case of Millissimo, not those who take the tricks, but their opponents, score. In addition, a Little Slam (12 tricks) counts 10 points, a Grand Slam (13 tricks) counts 20; the first game in a rubber counts 10, and the second (if won immediately after the first), 20. All these points remain the same, no matter what the trump is.

A game ends when one party has made 20 points in tricks alone. A rubber ends when two consecutive games have been won by the same side. After the first rubber, the dealer and the player at his left keep their seats, and the others change. After the second, the player opposite the dealer changes with the one who has not played with the dealer. This series of three rubbers constitutes what is called a "complete game." Each player keeps his own score, crediting himself with all points made by himself and each of his partners,

and after the third rubber, he who has most points is declared winner. As the end of the "small game" is determined by the points made by tricks alone, it is convenient to score them by themselves.

When five play, one always stays out of the game, he who drew the highest card staying out of the first rubber, the next to the highest out of the second, and so on. Each, on entering the game, sits opposite the player who drew the lowest card. When six play, two stay out in like manner.

PRISM, Experiments with a. The prisms used to separated white light into its different colors (see Light in C. C. T.) are three-sided. Such prisms are sometimes used also for ornaments on chandeliers or lamps. Larger ones are somewhat expensive, but a good prism can be made by fastening three squares of glass on a glass bottom, and filling with water the three-sided vessel so formed. The joints are made watertight with putty.

EXPERIMENTS.

1. Look through a prism at the edge of any bright object, or at a sheet of white paper pasted on black

2. Hold a prism P (see illustration), in a beam of sunlight admitted through a hole S, into the room. If possible, shut out all light from the room except the one beam. This may be done by closing the shutters at all windows but one, and covering that with sheets of thick wrapping-paper, in one of which is cut a small hole to admit the beam. The spot of light made by the beam on the wall or floor will show seven colors, which will be farther apart the larger the prism. The colors violet, indigo, blue, green, yellow, orange, and red are denoted in the picture at I H by their initial letters.

3. Take a bit of red sewing-silk, and hold it in each one of the colors. If the room is perfectly dark, the silk will appear black, or almost so, in each of them except the red. In like manner, yellow silk will appear black in each color except the yellow. This is because each piece of silk is able to reflect only its own color.

4. Look through a prism at the flame of an alcohol lamp in which salt has been dissolved. It will not appear colored at all, because such a flame is pure yellow and cannot be separated into other colors.

This is the only pure color easy to obtain.

5. Receive the colored spot on a hand-mirror, so as to reflect it to the ceiling, and tip the mirror rapidly, so as to make the spot move backward and forward. It will appear white, because the effect is the same as if the colors were mixed together again.

With the aid of a HELIOSTAT the colors can be separated much farther, into a band

paper. It will appear colored, in narrow stripes of red, yellow, and blue.

called the spectrum. The beam of light from the heliostat should be admitted to the room through

Experiment 2.

a narrow slit from one-eighth to one-quarter of an inch wide. This slit may be cut in a sheet of paper which is pinned over the hole through which the light passes. In front of the slit is placed a lens at such a distance as to throw a clear image of the slit on the opposite wall, or on a handkerchief held up before it. The prism is then placed in front of the lens. The spectrum will be thrown to one side, where it must be received on a white wall or screen. This must be exactly as far from the prism as the wall or place where the clear image of the slit was formed, otherwise the spectrum will not be clear. If the wall is just at the right distance, and the slit is narrow enough, vertical black lines are seen across the spectrum. These black lines are caused by the sun's atmosphere, which stops some colors of light and lets others through. Colored liquids also let through part of the light and stop other parts, as may be seen by placing various liquids in the path of the ray. For this purpose a thin transparent vessel is needed. One may be made by fastening together with shellac varnish two pieces of window glass, about four inches square, an inch apart, by means of wood strips on three sides. Carmine dissolved in weak ammonia water, placed in this vessel and held in front of the light, either between the slit and lens, or between lens and prism, only lets through a little of the red light, if the solution is strong. When it is weakened, two upright black bands will be seen across the spectrum in the greenish-yellow part of it. A little blood, mixed with water, also gives two bands, but they are in a slightly different place from the carmine bands. This is an easy way of telling carmine from blood, though their colors are almost exactly alike. By trying all sorts of colored substances, dissolved in water, it will be found that

each cuts off the light in a different way.

PRISONER'S BASE, an out-door game played by any number of persons, though the best number is from 12 to 16. Two "Bases," or enclosures, are marked off, each large enough to hold half the players, and two "Prisons" a little smaller, from one to two hundred feet from the Bases, according to convenience. Two methods of laying out the ground are shown in the diagrams. The players are divided

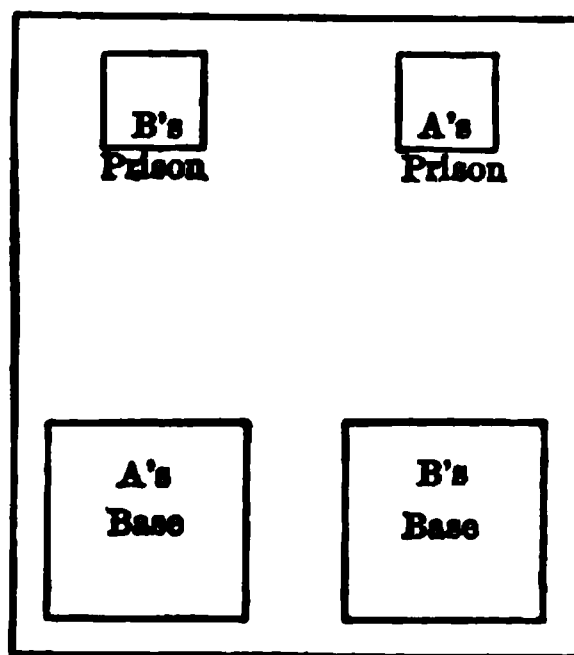


Fig. 1.

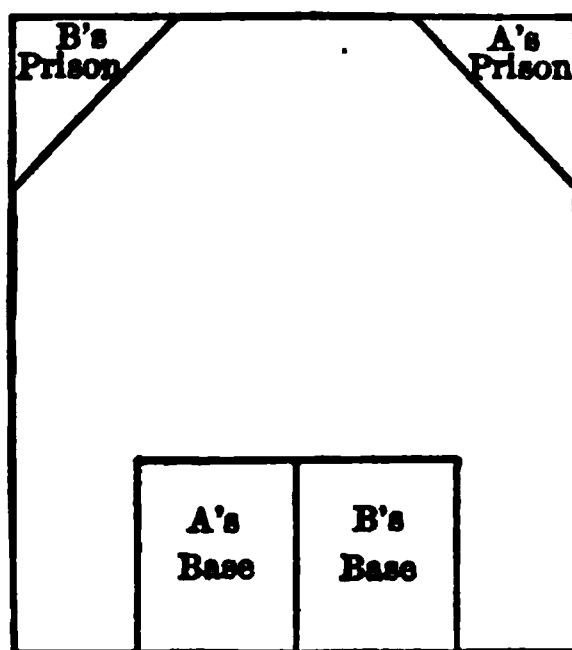


Fig. 2.

Prisoners' Base Grounds.

into two opposing sides, each of which occupies one of the Bases. A player from one side begins the game by running beyond the bounds of his Base, and one on the opposite side pursues him. A second man from the first party chases the pur-

suer, and so on, each party sending out as many men as they choose. If any one is touched, while out of bounds, by a player on the opposite side, who left bounds after him, he must go to the Prison belonging to the enemy, and stay there till he is released by one of his own side. The Prison of each side is opposite the Base of the other side, as shown in the diagrams. No one is allowed to touch the catcher as he returns to his Base, which he must do at once. A prisoner can be released by any one of his friends who can run from his Base to the Prison without being caught.

The prisoner and his friend are then allowed to return to their Base in safety. But if a player is caught while attempting a release, he must himself go to Prison. The game is won by the party that succeeds in getting all its enemies into Prison at the same time. It is necessary for a player to remember who of his opponents left their Base before him and who after him, so that he may know whom to chase and whom to avoid. When a large number of players are out of bounds, this makes the game quite complicated.

The game of Prisoner's Base was played in England as early as the fourteenth century, for a proclamation in the reign of Edward III. forbids children to play it in the avenues of the Palace of Westminster during the sessions of Parliament, as it annoyed the members. Shakespeare also probably alludes to it in the play of Cymbeline, where he speaks of

"... Two striplings, lads more like to run
The country base than to commit such
slaughter."

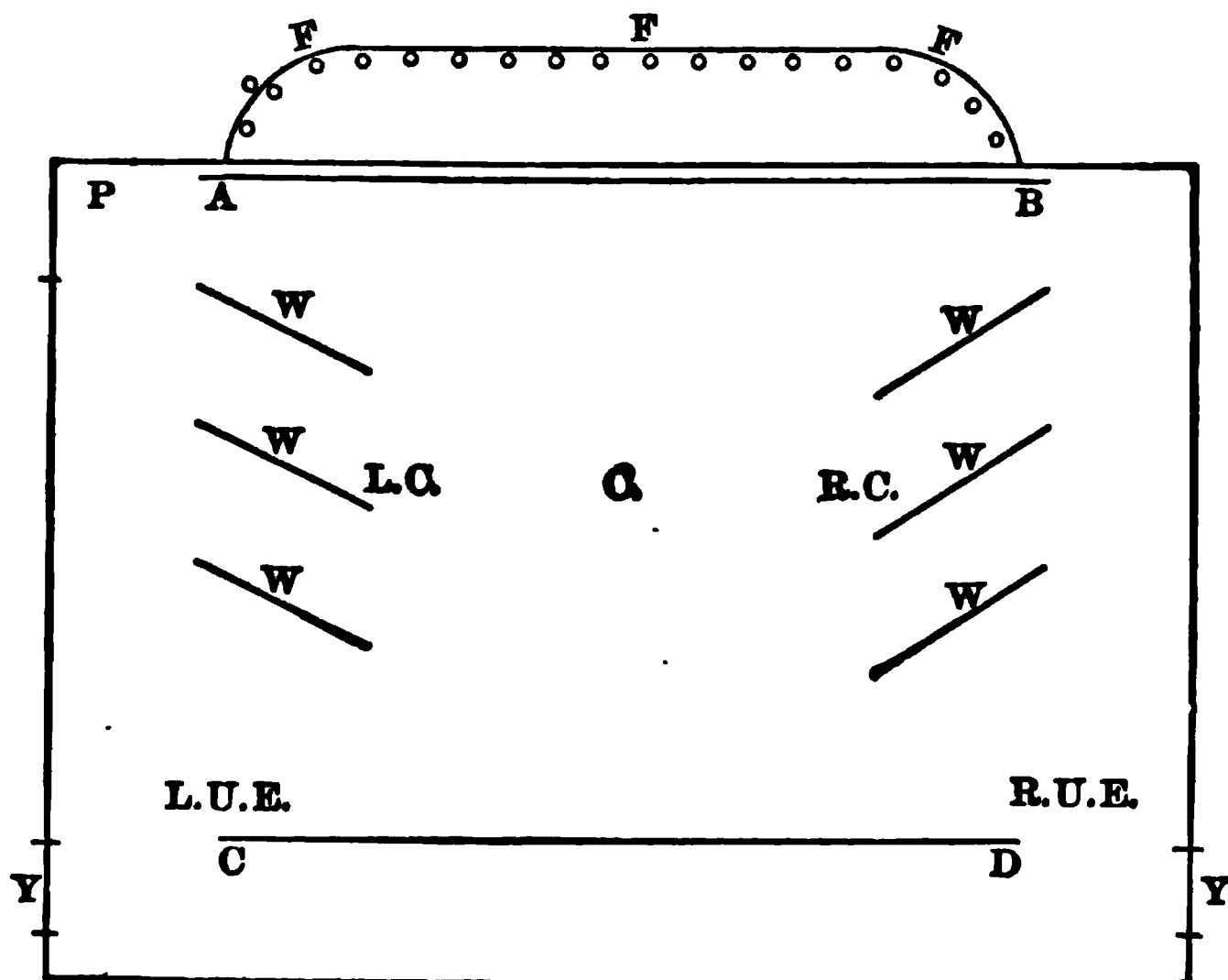
It was a favorite in the county of Cheshire, and was played by men as well as by boys. As played there, no Prisons were used; these were added in the county of Essex. About 1770 a match game of Prisoner's Base was played in London

between twelve gentlemen of Cheshire and twelve of Derbyshire.

PRIVATE THEATRICALS. If the theatricals are held in a hall, the stage and its accessories will usually be found ready; if in a private house, a stage must be arranged specially for the occasion.

Stage. The only things absolutely necessary are that the stage shall be separated from the audience by a curtain, or sliding doors, and that it shall have at least one door in the side. In a house where there are double parlors, separated by sliding doors, one room may be used as the stage and the other for the audience. If there is only one long parlor, a curtain may be hung across one end. It is better that the floor of the stage be raised, but in a private house this is generally too much trouble. It may be arranged, however, by laying boards on supports called "horses," all of which may be hired at a carpenter's shop.

Scenery. The scenery on a small stage is usually of three kinds: (1) "the drop," or curtain at the back of the stage, (C D in the plan), on which is painted a landscape, a street, or a representation of the interior of a building; (2) "flies," or "borders," strips of painted canvas hung across the top of the stage at intervals, to represent sky or ceiling; and (3) "wings," or framework covered with painted canvas (W in the plan), which slide in grooves, or are otherwise fastened at the sides of the stage, inclined a little away from the audience. When an interior is represented these are often replaced by one large piece of canvas, called a "flat." In large theatres elaborate scenes are often "built up" to look as much as possible like reality. In a private house plays are usually chosen that require but one scene, generally the interior of a room, which is easily represented; but any one with a talent for painting, and the necessary time, may paint drops, flies, and wings.



Plan of Stage.

FF, foot-lights ; AB, curtain ; CD, drop ; C, centre ; LC, left centre ; RC, right centre ; LUE, left upper entrance ; RUE, right upper entrance ; WW, wings ; P, prompter ; YY, exits.

Models of these may be bought of dealers in theatrical material. For a hall unprovided with scenery, an interior scene can easily be arranged by getting three frames made at a carpenter's, the size of the required walls. There should be a real door in each, and at least one "practicable" window ; that is, a window that will actually open. The frames must be covered with wall-paper and held in place by braces. If possible, a space should always be left behind the rear scene, so as to secure a passage from one side of the stage to the other. This is generally impossible in a private house. Very good garden scenes can be made with potted plants. The different parts of the stage, and its Entrances, are given special names, which are abbreviated into letters. If a person stand in the middle of the stage, facing the audience, he is said to be in Centre. The part of the stage on his right hand is Right,

that on his left hand, Left. The direction toward the audience is "down," and toward the back of the stage "up." When there are wings, the spaces between them are "entrances." When there are two on each side of the stage, they are the Right Upper, the Right Lower, the Left Upper, and the Left Lower entrances. When there are more, they are often numbered. In a flat, there are real doors. In a private house one door usually has to do duty for two, or more entrances. The abbreviations used for these various terms are as follows

- C. Centre.
- R. Right.
- L. Left, or Lower.
- R.H. Right Hand.
- L.H. Left Hand.
- E. Entrance.
- U. Upper.
- F. Flat.
- D. Door.

For instance, L.C. means Left of the

Centre, L.H.F., C.D., Left-Hand Flat, Centre Door, and R.L.E. Right Lower Entrance.

Fig. 1.—Foot-light.

Lighting. The stage is lighted by a row of lamps or gas-jets along the

Fig. 2.—Foot-light Screens.

front, called foot-lights (FFF in the plan), by one or more rows above,

Fig. 3.—Tin Foot-light Screen.

between the flies, and by lights between the wings. The foot-lights are placed in a sort of trough, so that they are invisible to the audience, as in fig. 1; or they are screened by pieces of wood or tin, as in figs. 2 and 3. These screens may be cut from tin, as in fig. 3, so that they will stand alone.

Where gas is used, it should be so arranged that any or all the jets can be regulated by one man, who may thus darken the stage at pleas-

ure. If lamps are used, a narrow strip of cloth should be hung close inside the foot-lights. It lies on the stage unobserved till the string on which it hangs is stretched tight, when it rises and darkens the stage.

Fig. 4.—Portière Curtain.

In a private house where the stage is not raised, there are no foot-lights, and lamps should be placed on the floor, and on tables or boxes at each side of the stage close to the curtain, where they will not be seen by the audience, as in fig. 5.

Curtain. The position of the folding or sliding curtain on the stage is shown at AB in the plan of the stage. In a private house, doors may be used instead of a curtain, or an ordinary *portière* may be hung by rings on a cord stretched across the room as shown in fig. 4. It may be drawn aside by a cord, tied to the last ring, A, on one side, and running thence, through the screw-eye B in the wall, and then to the hand of the curtain-puller. It can be closed by another string fastened to the same ring, but running through the screw-eyes C and D. Two curtains may be tacked to a pole or strip of wood at the top, and drawn aside, as in fig. 6, by strings passing from the inner lower corners to screw-eyes on either side, through two or more rings sewed on the inside of the curtains, in a diagonal line from corner to corner, as shown in the figure, where one curtain is down, and the other partly raised.

Fig. 5.—Arrangement of Lamps in House.

when the strings are let go, the curtains will fall by their own weight. A curtain can be drawn directly up rings, brought up through all the rings above it; then through a screw-eye on the strip of wood at

Fig. 6.—Side Curtains.

(as in fig. 7) by tacking a strip of wood to it at the bottom, and then sewing to it vertical lines of rings two or three feet apart, the rings in each line being one or two feet apart. A cord must be tacked to the bottom strip below each line of

Fig. 7.—Curtain with Rings.

the top of the curtain, or on the ceiling; and then across to a screw-eye above the curtain-puller. By pulling all these cords at once, the curtain is gathered up into folds.

Curtains that roll up (fig. 8) are fastened firmly at the top and tacked at the bottom to a wooden roller, three or four inches in diameter. A stout cord is tacked to the roller at one end, beyond the curtain, and then wound around it a number of turns equal to the length of the curtain. The cord is then passed over a pulley in the ceiling. When the cord is pulled,

should be, so as to appear in the picture.) A very small curtain may be put up with ordinary window-shade fixtures.

After a play has been selected, a stage-manager, a property-man, and a prompter must be selected. The duties of any two of these, or of all three, may be undertaken by the same person. In any case, none of them must be a performer. The stage-manager should be a person of experience, and should have full authority in all matters pertaining to the arrangement of the stage, the conduct of rehearsals, and the performance of the play. If no such person is available, it is better to have an inexperienced chief than none at all. It may be agreed that such a manager is merely to decide in disputed questions.

The prompter must sit at one side of the stage, close to the curtain, (P. in the plan), and "prompt" those who forget their parts; that is, tell them the next three or four words. He should be present at every rehearsal, and not only know the play thoroughly, but the manner of each actor, so that he may know an intentional pause from one caused by forgetting a speech. There should be no occasion for prompting at all; but if there is, it should be done quickly and plainly, yet in such a tone that the audience cannot hear. Usually the prompter should also act as curtain-puller, and see that all noises, calls, etc., are made that are required off the stage, unless such are to be made by some particular one of the characters. Thus, a knock, a footstep, a cough, the noise caused by the breaking of a piece of glass, should usually be made by the prompter; and that he may not forget what he has to do, he should go over the play beforehand and mark on the margin all places where such noises are to come in.

The property-man takes charge of all properties, that is articles of any kind used in the course of the

Fig. 8.—Curtain with Roller.

it will, by unwinding, turn the roller, and thus roll up the curtain. The roller should be on the inside of the curtain, and therefore the cord should be so wound that the end leaves the roller on the inside. If the curtain is wide, there must be on the other end a similar cord passed over a pulley, across the stage at the top, and then down to the curtain-puller. (In the illustration the pulley is made much lower than it

play, such as letters to be read, meals to be served, or flowers to be carried. He must go over the play carefully beforehand, make a list of the properties, and see that they are all prepared. He must make notes on the margin of his copy of the play at the places where the various properties are needed, and see that they are ready at the right time. Thus, if one of the characters is to walk in smoking a cigar, the property-man must see that he has the cigar before going in; and if a waiter is to bring in water on a tray, it is the property-man's duty to have ready the tray and glasses. These things are often left to the actors themselves, but it is better to entrust them to one man who has memoranda of them all, and knows exactly where each is needed.

Rehearsals. The stage-manager requires each performer to know his part thoroughly before the first rehearsals. Before beginning to study, each one should read the whole play carefully several times. Long soliloquies and speeches may be learned separately, but conversation must be studied in connection with the other parts. One who can commit to memory easily may learn all of those portions of the play where he appears, including not only his own part, but those of the other actors. Otherwise, he should learn the last few words of each speech just preceding one of his. These words, which are called his "cue," enables him to know where the other actor has finished speaking. It is an aid to the learner for some friend to hear him recite his part, reading the speeches of the other actors as they come in; or the learner may hold the book before him and read the play, reciting his own speeches as they occur. If possible, each actor should have a complete copy of the play. If this cannot be arranged, each part should be copied legibly, with all its cues, and, that all may study intelligently, the play should

first be read aloud to the performers. At the first rehearsal, the various entrances, positions, and attitudes of the play must be decided on. Many of these are given, in printed plays, but the minor ones can be varied. Those that are finally adopted must not be changed, for then each performer will associate each speech with some definite part of the stage, or some particular action, and he will thus remember better both the words and actions. After the first two or three, the rehearsals should be as much like actual performances as possible, and there should be at least one "dress rehearsal," where every detail of costume and every property is exactly as it is to be when the play is given. During the first rehearsals, if the stage-manager sees a fault, or anything that might be improved, he stops the players at once, explains the point to them, and then requires them to repeat the passage according to his views. But all such corrections should be made in the early rehearsals. During the last ones it is of the first importance that the play should go smoothly and without interruption. The number of rehearsals required will depend on the skill of the actors. In ordinary cases, several rehearsals are usually occupied in learning the parts, it being very difficult to make the performers study them properly at home. The best plan is for the stage-manager not to appoint the first rehearsal till each actor, separately, gives notice that he has memorized his part and is ready to begin.

Two faults common to most beginners are that they do not speak loud enough, and that they speak too fast. Every word, even those parts of the dialogue supposed to be in low tones, should be spoken as if to the person that sits farthest from the stage. The actor is apt to think that he is really speaking for his fellow-actor to hear instead of for the audience.

Costumes. The proper costumes are usually indicated at the beginning of a printed play, but these may often be varied by the actors according to circumstances. Sometimes the action of a play is supposed by the author to take place in some past age simply for the sake of the picturesque costumes, and when these cannot be obtained, the performers may wear modern dress without making other than trivial changes in the text. In dressing for the stage, the actors should remember that delicate effects, such as would be seen in a drawing-room, are lost to the spectators.

Making up. Painting the face so as to change the expression, putting on false wigs, whiskers, etc., is called "making-up." False hair is best hired at a costumer's, but when none is accessible, very good wigs can be made by sewing hair on skull-caps of cloth. A negro's wig can be made of the curled hair used to stuff furniture, and light-colored hair can be imitated by using flax, tow, or jute. Beards, side-whiskers, and moustaches can be made in like manner on cloth, and fastened to the face either with fine sewing silk, adhesive plaster, spirit gum, or flour paste.

For blackening the face, or making dark lines, an ordinary bottle cork burned in the flame of a candle or lamp answers very well. Burned cork is hard to wash off. To remedy this, sweet oil or vaseline may be rubbed over the face before the cork is applied. For reddening the face, carmine is generally used, and for whitening, lily-white, both of which may be bought at any drug-gist's. Paints specially prepared for "making-up" can be bought at a costumer's. For giving to the face any desired expression, the best way is to assume that expression, as nearly as possible, before a mirror, and then trace the wrinkles of the face with black lines. In general, parts of the face intended to look hollow should

be blackened, as they will then appear in shadow. Where there are foot-lights, it should be remembered that they cast the shadows of the chin and nose strongly upward over the face, and to counteract this effect lily-white should be freely used. But the amount of "making up" must depend largely on the distance of the audience. In a private house it should be very slight.

PROGRESSIVE GAMES, games played by any number of sets of people at once, where the winners of each game move to a different table. The games commonly played are EUCHRE, WHIST, HEARTS, and ANGLING, but others may be substituted. The tables are numbered, and it is decided who shall sit at each of them usually by passing around numbered cards, which also serve as score-cards. Partners can be decided on at each table by cutting the cards, but it is usual to have the score-cards decorated in pairs, and those players having the same device on their cards play together. All begin to play on the stroke of a bell on table No. 1. When the players at that table have finished one game, the bell is struck again, and all playing ceases. Those players who are ahead at each table when the bell sounds, have their score-cards marked usually by sticking on them a small gilt paper star or by punching a hole in them; the losers' cards are marked by a star or figure of some other shape or color, or left unmarked. The winners now move to the next table, those at table 4, for instance, going to table 3, and these at table 3 to table 2; while those at the head table go down to the last. Playing then begins again, and so the game proceeds till some hour agreed upon beforehand. A prize is usually given by the lady of the house to the player who has the largest number of winner's stars. Sometimes there are several prizes, and often a "booby prize" is given

to the one getting most of the loser's stars or marks. There may be one or more tables called "booby tables," the losers at which receive a special mark, and he who has most of them is given the booby prize. Just after the winners change tables, they may also change partners with those whom they find at the new table, or the same partners may be kept; but whichever is done, all should follow the same rule throughout the evening. Sometimes, instead of the winners moving up, the losers move down, in which case the game is called "Drive." Sometimes the winners move up till the head, or "King" table is reached, and at this table the losers move down to the lowest or "Booby" table. The only games suited to



PROGRESSIVE EUCHRE.	
JAN. 16 TH , 1889.	
WON.	LOST.
☆☆	♥♥
☆☆	♥♥
☆	♥
☆	♥

Score Card.

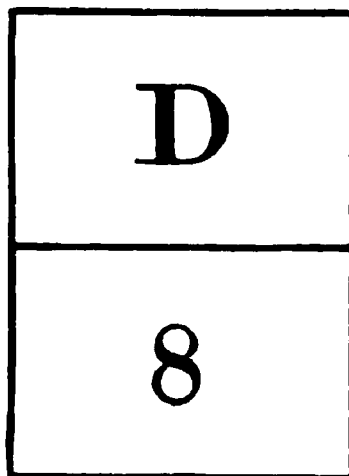
progressive playing are those that are short, so that a great number of changes can be made in an evening. They must also be such that it is easy to tell which side is ahead at any time, for when the players at the first table finish and strike the bell, those at the other tables are usually in the midst of a game. For these reasons, Euchre is one of the best games to play in this way, the form called Railroad Euchre being generally preferred.

PROHIBITED WORDS, a game in which the use of certain words is not allowed in answering questions.

The words are those often used in conversation, such as Yes, No, Why, But, or any others like them, and are agreed upon by the company before the game. One of the players is chosen to ask the questions, which may be on any subject. He asks one of each player, in order, purposely framing them so that it will be difficult to answer without using a prohibited word. When any one does so, the offender pays a forfeit and takes the questioner's place.

This game is said to be of Italian origin.

PROTEAN CARDS, a pack of 104 cards, 52 printed in black and 52 in red. Each card bears a letter of the alphabet on its upper half, and a numeral on its lower.



Protean Card.

A great number of games can be played with these cards, many of which are nearly the same as the principal games of CARDS and DOMINOES. They can be used also for LOGOMACHY and other letter

games. The cards are sold at toy-stores, with a little book describing 50 games that can be played with them. Protean cards were invented by Mrs. Mary Mapes Dodge (C. P. P.), the editor of "St. Nicholas." Protean means easily changing its shape, from Proteus, the name of a fabulous divinity who could take different forms at will.

The cards are called Protean because so many different games can be played with them.

PROVERBS, a game in which one of the players tries to guess a proverb chosen by the rest of the company. The guesser goes out of the room, and when the proverb has been chosen, each player in order is given one of the words that compose it. The guesser is then called

in, and asks a question of each player, who must introduce his word into the answer. Thus, suppose the proverb chosen to be "Make hay while the sun shines." The first player may be asked "How do you do this evening?" and may answer "Very well, but your questions make my head ache." The second question may be, "What have you been doing this afternoon?" and the answer, "Playing in the barn, on the hay," and so on. If the proverb is guessed, the one whose answer gave the clue must take the guesser's place. If it is not, the guesser must pay a forfeit and go out again.

RULES OF THE GAME.

1. If there are more players than words in the proverb, the words may be given out twice or more; and if there are fewer, some of the players may take two words. In either case, the guesser must be told, when he begins, where the proverb ends, which players have two words, and whether they intend to put those words in the same answer or different answers.

2. The word must be given exactly as it appears in the proverb; not in another tense, mood, or number.

3. If the guesser fails, he may try the same proverb again, after paying his forfeit, or call for a new one.

Shouting Proverbs, a kind of Proverbs in which, at a signal from the guesser, all the players shout their words at once. This may be repeated a number of times agreed on beforehand. If the guesser tries to listen to all the words at once, he will find it very hard to understand any of them; but if he stands near one player at a time and listens only to him, the proverb is easy to guess. For this reason the guesser may be required to stand at an equal distance from all the players. They may sit in a circle, while he stands in the middle.

Acting Proverbs, a kind of Proverbs in which the players choose sides, and one acts an impromptu play, illustrating a proverb, while the other side tries to guess what proverb is meant.

Parallels, a game in which one of the players tells a story to illustrate some familiar proverb, while the others guess what it is. The story continues till the proverb is guessed correctly, when the successful guesser becomes story-teller in his turn.

One way of playing is to choose sides. The sides stand in opposite lines, and a story told by a player on one side must be guessed by some player on the other side. At the expiration of some fixed time, generally from half an hour to an hour, the side one of whose members is telling a story is declared the winner.

Split Proverbs. The company sits in a circle, and one, beginning the game, throws a handkerchief at another of the players, saying, as he does so, the first part of a proverb, which the other must immediately finish by adding the last half of a different proverb. The two must make a complete sentence, but it may be nonsensical or ridiculous. The one who throws the handkerchief counts ten distinctly as he does so, and if the other does not begin to finish the sentence by the time the first has ended his counting, he must pay a forfeit. The one at whom the handkerchief was thrown then continues the game by throwing it at another player and beginning another proverb. For the sake of illustration some examples of split proverbs are given below:

A rolling stone—knows his own father.

A wise son—gathers no moss.

Make hay while the sun—sweeps clean.

In Germany this game is called *Verkehrte Sprichwörter* (Perverted Proverbs).

PUMPS. Pumps are described in C. C. T. To make a suction-pump,



Fig. 1. Home-made Suction-pump. To make the piston, take a rubber stopper, *d*, a little smaller than the upper part of the chimney, and make it fit tightly by winding it with twine, if necessary. This stopper must have two holes. Through one fit the end of a glass rod, *e*, for a piston-rod, letting the lower end project a little, and winding it with twine just above and just below the stopper, so that it can pull through neither way. Over the hole in the lower stopper, and over the second hole in the stopper that serves as piston-head, fasten valves made of bits of rubber cloth or leather,

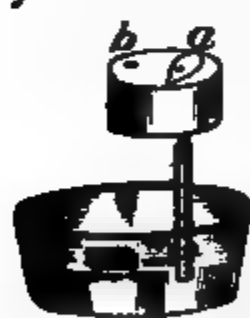


Fig. 2. Valve. secured at one edge with one or two tacks, so that they will flap up and down. The valve is shown more plainly in Fig. 2. At the top of the chimney fit another stopper with two holes, through one of which the glass piston-rod slides, while in the other is fitted a glass tube, *f*, to deliver the water.

To make a force-pump (Fig. 3), the lowest stopper must have two

holes, and the valve-hole in the piston-head must be plugged. With



the other hole is connected an air-chamber *b*, made of a vaseline bottle, as shown in the figure. The stopper of this air-chamber has two holes. Over the one that connects with the pump is a valve. The other is fitted with a jet. **Steam - Pump.** Fig. 3. Force-pump. Fill a flask (see CHEMICAL EXPERIMENTS) half full of water, and close it with a tight cork or rubber stopper, through which passes a glass tube reaching nearly to the bottom. To the tube fasten three or four feet of rubber tubing. Place the flask over an al-

Fig. 4.

cohol lamp or Bunsen burner, and the water will presently rise in the tube and flow out of the end. The reason is, that it is forced out by the pressure of the heated water vapor in the upper part of the flask.

Pumps without a Piston. 1. Take a glass tube several feet long, and

large enough to be stopped conveniently with the finger or thumb. Plunge the end in the water, and then stopping the open end, draw it quickly up, but not far enough to pull the lower end out of water. Continue this up-and-down motion rapidly, always opening the tube while pushing down and stopping it while pulling up. The water will rise, and finally flow out at the top of the tube at each downward push.

2. Hold a common glass funnel,

large end downward, in a pail of water (see Fig. 4.), and rapidly move it up and down. The water will rise into the small end, and with practice may be made to spout out of it for some distance.

PUNCH AND JUDY, a theatrical entertainment, in which the performers are puppets, operated by an unseen person. The puppets are so made that the exhibitor can slip his hand and wrist into their bodies, inserting his forefinger into the head

Punch and Judy Show.

and his thumb and second finger into the arms. The exhibitor shows the puppets to the audience through an opening about two or three feet square, just above his head; only two appear at a time, one being operated by each hand. The open-

ing may be made by hanging a curtain in an ordinary doorway between two rooms, so that it just hides the exhibitor when he stands upright. Another arrangement is made by taking a dry-goods box two or three feet square and hanging or

supporting it against the wall. The front and bottom of the box must be open, and from the front and sides curtains hang to the floor, concealing the exhibitor. In either case an ornamental wooden or pasteboard frame may be placed around the opening on the side

toward the audience, and it is convenient to have a shelf at the bottom of the opening, projecting outward to form a sort of stage.

The chief characters are always Punch and his wife Judy, but many others are usually introduced, generally including a doctor, a police-

Fig. 1.

Fig. 2.

man or constable, and a hangman. Punch has a hooked nose and chin, pointing toward each other, and is the only one of the puppets whose

legs are seen by the audience. They are made to hang loosely, so that he can dance on the stage. He holds a stick about a foot long, by

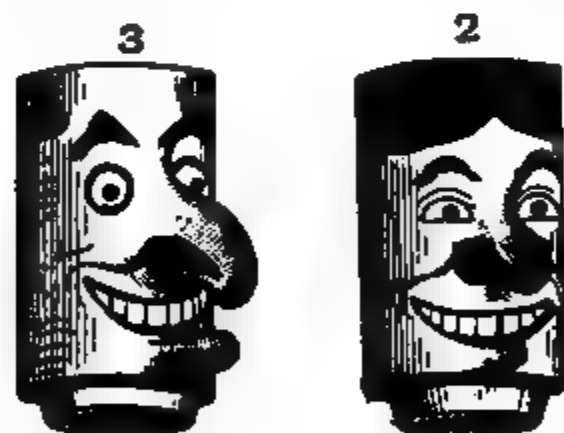


Fig. 3.—Punch (1), Judy (2), and Hangman (3).

pressing it with his arm against his side. When he strikes any one with it, his whole body bobs forward. The heads of the puppets are painted on rolls of cardboard, as in Fig. 1, or cut out of hollow pieces of wood like Fig. 2, when they look like Fig. 3. The projecting ridge on one side of the cylinder is shaped

with the knife into the nose and chin. In any case the figures have a hole at the bottom for the exhibitor's forefinger; the bodies are fastened to them with glue or tacks. The exhibitor speaks for each of the performers, and carries on a sort of drama, generally opening with a scene between Punch and his

wife Judy. Punch disposes of the other characters one by one, by killing them with his stick, and throwing their bodies on the stage. At the close, the hangman comes to execute him, but Punch pre-



Fig. 4.—The Baby.

tends he does not know how to put his head into the noose, and when the hangman undertakes to show him, Punch pulls the rope and hangs the executioner himself.

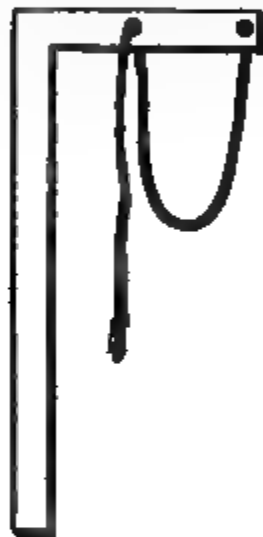


Fig. 5.—Gallows.

The gallows is one upright stick with a cross-beam, and fits into a hole in the shelf. At the end of the beam are two holes, through which passes a string, secured at one hole by a knot, and forming a sort of noose between the two. The action of the rest of the drama depends on the ingenuity of

the exhibitor. Punch speaks in a peculiar squeaking voice, and gives a sort of squeal of joy at the discomfiture of his enemies. The squeak may be produced by an instrument called a Punch and Judy Trumpet (see Fig. 7), made of two half rings of wood and a bit of ribbon. The manner of speaking must be learned from some one who knows it. Those performers who have not yet made their appear-

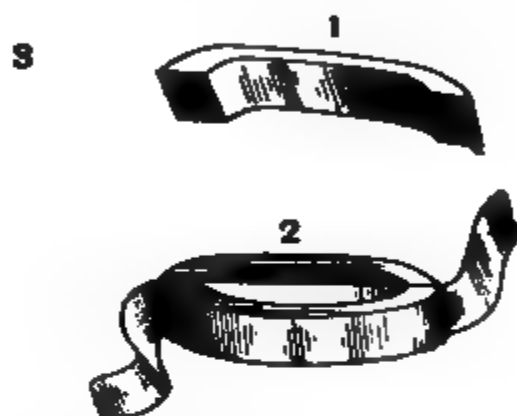


Fig. 7.—Punch and Judy Trumpet.

ance must be laid on a chair or hung on hooks, within easy reach of the exhibitor.

PUSH PIN, a **SOLITAIRE** game of **CARDS**, played with two packs. The cards are laid out in a straight line, face upward, as they come from the pack. Any card that lies between two of the same suit, or two of the same value, as any two Hearts, or any two Queens, is pushed out of place, and two or more of the same suit between two of the same value may also be pushed out. The card at one end of the row may be removed to the other, or, what is the same thing, the cards may be placed in a circle. The player wins if he can push out all cards but two.

PUSS IN THE CORNER, a game played by several persons, each of whom stands in the corner of a room. One player, chosen as Puss, stands in the middle. As the others change corners, two by two, which they try to do when the Puss is not looking, he attempts to slip into one

Fig. 6.—Punch and Judy dressed for the Play.

of the corners, and if he succeed, the player thus left out must be Puss in his turn. The game may be played out of doors, when trees, posts, or stones may be used as corners. In such a case, Puss has only to touch the tree or stone after one player has left it, and before the player with whom he is changing places touches it.

PUZZLE DRAWINGS, a game played by any number of persons, each with pencil and paper. Each

player draws on his paper some kind of a line, straight, curved, angular, or all three, and the papers are folded and mixed. Each then selects one, and must draw a figure that is partly formed by the line on the paper. Those who do not succeed must pay forfeits. One who is used to the game can often make a creditable picture with a line so jagged and irregular that the task seems impossible.

PYRAMID. See **CHECKERS**.

Q

QUADRALET, a game played by any number of persons with 49 square pieces, completely filling a shallow square box. One of the pieces is marked with a black dot, and of the others half are white and

when the game has been won. If the player finds it necessary to

Quadralet.—Fig. 1.

half brown. The pieces are arranged in a pattern, and the dotted one removed. If the game is played as a **SOLITAIRE** game, the player's object is to make the white and brown pieces change places completely, by moving them one by one into an adjacent empty space. When more than one play, he wins who can do this in the least number of moves. For instance, if the pieces are arranged at first as in Fig. 1, they will look as in Fig. 2

Quadralet.—Fig. 2.

move a piece back, that counts as a move. The word *Quadralet* is from the Latin *Quadratum*, a square.

QUAKER MEETING, a game played by any number of persons, who have handkerchiefs tied around their heads, and are supposed to represent Quakers. A leader is chosen, who takes the other players, one by one, into another room, and tells each some ridiculous thing to do, such as to walk across the room on all fours grunting like a pig, or to go around kissing the furniture (see **FORFEITS**). When all have been thus instructed, the

players sit around the sides of the room, and the leader points to them, one by one. Each, as he is pointed out, must do the task assigned him.

During the game none of the players must speak, laugh aloud, or make any other noise with the mouth or lips, under penalty of a forfeit.

This game is called Quaker Meeting, because at the religious services of the Society of Friends (called Quakers) all present often sit for a long time without speaking a word or making a sound.

QUEEN DIDO IS DEAD, a game played by any number of persons, who stand in a circle, or in a row. The player who begins the game says to his neighbor, "Queen Dido is dead!" The neighbor inquires of the speaker, "How did she die?" and the answer is, "She died doing so." As the last word is spoken, the speaker begins to shake his right hand up and down, and he continues the motion through the game. The second player now repeats this conversation with the one next him, and when it has gone the round of the company all are shaking their right hands. During the second round the speaker, at the word "so," begins also to shake his left hand; on the third round, to stamp his right foot; on the fourth, his left; and on the fifth to nod his head. By this time the appearance of the company is very laughable, and all are generally tired; but if it is desired to continue the game, each player, as he says "She died doing so," may begin to run around in a small circle.

There are many variations of this game. In one of them, called "My Aunt Ion," the conversation is, "Do you know my Aunt Ion?" "No." "My Aunt Ion does so." In another, called "Neighbor, neighbor," it is, "Neighbor, neighbor, how art thou?" "Pretty well, I

thank thee. How's the neighbor next to thee?" "I don't know, but I'll go see." Here each player begins to make the new motion as he asks the first question.

QUEEN'S PARTY, THE, a SOLITAIRE game of CARDS, played with one pack. The first sixteen cards, in the pack are laid, as they appear, in four rows of four each, forming a hollow square. These cards are called the Ante-chamber, and the space within them is named the Audience Hall. The cards, representing guests, are taken from the Ante-chamber, or directly from the pack, and placed in the Audience Hall in their proper positions, which are as follows: The King and Queen of Hearts at the top, of Diamonds at the bottom, of Clubs at the right, and of Spades at the left. The Queens are placed on the Kings, and each pair must enter the Audience Hall together.

The Aces (called Emperors) are in like manner accompanied by the Knaves, which are placed on them, and are laid in the corners of the Audience Hall. On the Knaves are placed in order the other cards (called common people) following suit. Spaces left by guests, in passing from the Ante-chamber, are filled from the pack, and those cards that can be placed neither in the Ante-chamber nor at once in the Audience Hall, are laid aside to form stock, the top card of which can also be used at any time. If the whole pack can be brought thus into the Audience Hall, the player wins.

QUERIES, a writing game played by any number of persons. Each writes at the top of a piece of paper a question on some historical or other subject, and then puts the answer at the bottom, folding up part of the paper so as to hide it. The papers are now passed around in regular order. Each one answers the queries to the best of his ability, folding the paper to hide his

answer. Finally, the papers are unfolded and read.

QUICK MOTION, Experiments on. The following experiments are all explained by the fact that motion can be imparted to objects but gradually, and that when it is done suddenly the objects often prefer to break or give way, rather than pass the motion along, though it seems easier to do the latter.

1. Place a silver dollar on a visiting card, the edge of the card projecting half an inch beyond the edge of the table. If the card is moved gradually, it will carry the coin with it; but if it be snapped suddenly it will slide under the coin, which will not move. If the coin and card be placed on a wine-glass when the experiment is tried, the coin will fall into the glass.

Experiment 2.

2. Pile about ten checkers one on another. If one in the middle of the pile be pushed slowly with the edge of a ruler, the pile will be overturned; but if it be struck sharply with the ruler, taking care to give a perfectly horizontal blow, it may be knocked from the pile, leaving the remainder upright.

3. Suspend a small stick by one end from a string several feet long. If the stick be pushed slowly by a heavier stick, it will simply swing; but if struck sharply, it may be broken, the string moving very little.

4. Fix two screw-eyes on opposite sides of a croquet ball, and to each tie thread just strong enough to sustain the ball. Hang the ball up by

Experiment 4.

one of these threads. If the other be pulled slowly, straight downward, the upper string will break; but if it be jerked suddenly, the lower one will break.

5. Fix a needle at each end of a broomstick, and support it by resting the needles on the edges of two wine-glasses, which stand on chairs. By striking the broomstick violently in the middle with a stout stick, it may be broken without injuring the glasses.

QUININE, Experiments with. 1. Dissolve some quinine by putting a few grains into a bottle of water and leaving it two or three days, shaking it occasionally. It will dissolve quicker if a little tartaric acid, or a drop of sulphuric acid be added. Admit a sunbeam from a HELIOSTAT into a darkened room, and place a piece of dark blue glass over the aperture. Hold the bottle of quinine solution in the beam of light and it will glow with a curious blue

color which seems to come from within the fluid. By holding a bottle of pure water beside it, the difference between them will be perceived at once.

2. Into a glass of clear water held in the beam of blue light pour a little of the quinine solution. It will appear like a slowly descending blue cloud.

This property of quinine is called fluorescence. Another fluorescent substance is chlorophyll, the green coloring matter of leaves. It can be obtained by boiling tea leaves, pouring off the water and adding more from time to time, till it ceases to taste of tea. Then soak the leaves in hot alcohol, which will dissolve the chlorophyll. This solution treated like the quinine above gives a red light. A solution of madder mixed with alum produces a yellow fluorescence, soot dissolved in alcohol, a greenish blue, and petroleum a green.

Holding the Quoit.

QUOITS, a game generally played on level sward, by two or more persons, with flat iron rings or disks, which are pitched at a goal or hub. — The hubs, sometimes called motts,

are usually two pins driven into the ground, about eighteen yards apart. The players, who may be either two or three playing singly against each other, or four or six divided into equal sides, are each provided with an equal number of quoits, generally two. Each player, in turn, stands beside one hub and pitches his quoits so that they will fall and be as near as possible to the other hub. The first figure shows the manner of holding the quoit. Sometimes an expert player succeeds in encircling the hub with one of his quoits (called making a "ringer"), but this is very difficult.

This and other positions of the quoit at the hub are shown in the last figure. A is a ringer, B is called a "cutter," and C is said to be "pitched true."



Position of Quoits at the Hub.

After the first player has pitched all his quoits, the second player takes his turn, and then the others, if there are more than two. When all have played, all go to the other hub and reckon up the points, he whose quoits lie nearest to the hub counting one point for each quoit; but each quoit entitled to count must be nearer the hub than any of the opponent's quoits. The quoits are generally numbered or otherwise marked so that those belonging to each player can be easily known. When the points have been reckoned, the players then pitch their quoits at the other hub, and so on alternately until the game is won by one of the players or sides getting the requisite number of points. The number of points in the game is agreed on by the players beforehand, but it is usually eleven or twenty-one. He who rings the hub counts ten points towards the game. Boys

often play quoits with flat stones, which may easily be rounded so as to make them almost as good as iron ones. They use also a small stone instead of an iron pin for a hub.

RULES OF THE GAME.

1. The hub-pin must be driven in so as to project not more than half an inch above the surface.

2. Each player may select quoits of any size he chooses.

3. In pitching, each player must stand within three feet of the hub.

4. The distance of a quoit from the hub must be measured from the middle of the hub to the nearest visible point of the quoit. Thus, if the quoit is stuck into the ground, the part beneath the surface does not count.

Parlor Quoits. Quoits for use in the parlor are sold at toy stores. They are usually made of rubber,

a board which is placed on the floor.

A game called "*fababaga*," which is also sometimes called "*parlor quoits*," is played by tossing bean-bags at a hole in a board.

History. Pitching quoits was a favorite amusement among the ancients. The Greeks and Romans played with a kind of quoit called a *discus*, which had no hole in it, but was solid, like a plate. The illustration shows the celebrated Greek statue called the *discobolus* (*discus-thrower*), the work of the sculptor Myron, of which there are copies in the Vatican and elsewhere.

In England the hub or pin was formerly called the "*hob*." Countrymen, who could not get quoits of the proper form, played with horse-shoes, and in some parts of England a quoit is still called a "*shoe*." The word quoit is from the provincial English *coit*, to throw.

QUOTATIONS. A game played by any number of persons, who sit in a row or circle. One begins by repeating a quotation, either prose or poetry, and the next must then give one, the first word of which begins with the same letter as the last word of the quotation just given. The game goes on thus as long as the players choose. Any one who does not give his quotation in one minute (or any other time agreed on before the game) pays a forfeit. Instead of paying a forfeit, he may be required to leave the game, and it may thus be continued till only one is left, who is declared the winner. Any player may be required to tell the author of his quotation, or even the book, poem, or play where it is to be found, if it is so agreed. The following example shows how the quotations may follow each other:

"Know ye the land where the Cypress and Myrtle."—*Byron*

"Man never is, but always to be, blest."—*Pope*.

"Belgium's capital had gathered there,
Her beauty and her chivalry."—*Byron*.

"Come and walk with us, the Walrus did beseech."—*Carroll*.

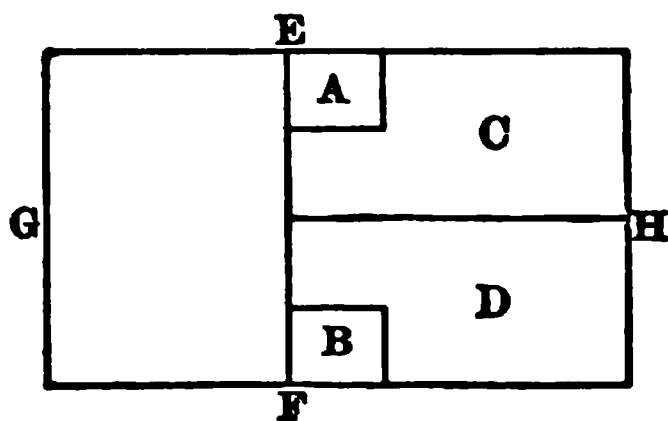
etc., etc.

Discobolus.

and the hub, or short stake, at which they are pitched, is fixed in

R

RACKETS, or RACKET (sometimes spelled Racquet), a game played by two or four persons with rackets and a ball, in a court surrounded by four walls. The floor is evenly paved, and marked as in the diagram :



Racket Court.

For double matches, with two persons on a side, the court was formerly 80 by 40 feet, but for single matches it was smaller. Of late years the standard court for both kinds of matches has been 63 by 31½ feet. The walls E, F, G, H are black on the inside, and the balls used are sometimes whitened by shaking them in a bag with some white powder, so that they will leave marks on the black wall where they strike. The front wall, H, should be 30 feet high, and is faced with planks to the height of 20 inches from the floor. The part so faced is called the "Telltale." About 10 feet from the floor is a horizontal white line called the "Service-line," or "Cut-line." A and B are called "Service-spaces," or sometimes "Rings;" C and D the Right and Left Courts; and E F the "Short-line." In the rear of the court is often a gallery for spectators, which is protected by netting. In the court there is usually an attendant called the Marker, who scores for the players and acts as umpire. The rackets used are similar to TENNIS

rackets, but longer and smaller in the face, and the balls are hard, about an inch in diameter, weighing an ounce.

The players decide by lot, or in any other way they choose, on the one to begin the game, who is called the "In-player" or "Man in." He stands in one of the service-spaces, and with his racket strikes or "serves" the ball so that it bounds from the front wall above the cut-line into one of the courts: C, if he served from B; and D, if from A. One of the players on the other side, called the Out-player, stands in readiness to "take the service," that is, to strike the ball either on the bound or before it has reached the ground. The Out-player may stand wherever he wishes, but in case of a double match, the two other players must stand behind the In-player till the ball is served.

If the ball is served wrongly, it is a fault, and when the server makes two consecutive faults his "hand is out," that is, he becomes the Out-player, and his adversary serves. After a good service the ball is struck by the players alternately against the front wall above the Telltale, and may fall in any part of the court. It may be hit on the "fly," or on the bound, but if any one fails to hit it, or hit it out of the court, it counts against him, putting his hand out, if he be the In-player, and scoring a point, or "Ace," for his opponent, if he be the Out-player. The game continues till one side, by making 15 aces, wins the game.

After the service, the ball may strike one or more of the other walls of the court after it has bounded from the front wall, and a skilful player often makes very puzzling strokes by driving the ball into a

corner, where it bounds about from one wall to another. This is the principal difference between Rackets and LAWN TENNIS. In Rackets, as in the latter game, the player can make the ball bound in different directions by "cutting" it, and as the ball has four walls to bound from, as well as the floor, a "cut" often causes it to take a very unexpected course.

RULES OF THE GAME.

The following rules are those of the New York Racquet Court Club, and have been adopted by the National Amateur Athletic Union :

1. The game to be 15 up. At 13 all, the out-players may set to 5 ; and at 14 all, to 3 ; provided this be done before another ball is served.

["Set to 5" means that instead of playing the remaining 2 Aces of the fifteen, 5 Aces are played. "Set to 3," that instead of the remaining one Ace 3 are played.]

2. On commencing the game, in a double match, whether odds be given or not, the side going in first to serve shall have but one hand ; but in a single match the party receiving odds shall be entitled to them from the beginning.

3. The ball shall be served alternately right and left, beginning on whichever side the server chooses.

4. The server must stand with at least one foot in the "service box," and serve the ball over the line on the front wall and within the proper service-court ; otherwise it is a "fault." Serving two faults, missing the ball, or the ball served striking anywhere before it reaches the front wall, is a hand-out.

5. All balls served or played into the galleries, hitting a beam, iron rod, the telltale, or any wood or netting, or above the cemented lines of the courts, although they may return to the floor, count against the striker.

6. A ball, to be fair, must be struck before or on the first bound,

and must not touch the floor, the galleries, the telltale, or any wood or netting, or above the cemented lines of the courts, before or after reaching the front wall.

7. Until a ball has been touched or bounded twice it may be struck at any number of times.

8. Only the player to whom a ball is served may return it.

9. A ball touching the striker or his partner before the second bound loses a hand or an ace.

10. If a fair ball hit the striker's adversary above or on the knee, it is a "let," and shall be played over ; if below the knee, it counts against the striker.

11. The out-players may once only in each game exchange courts to return service.

12. Every player should try to keep out of his adversary's way. When a "hinder" is claimed it shall be decided by the marker.

13. The marker's decision, on all questions referred to him, shall be final. If he is in doubt he should ask advice ; and if he cannot decide positively, the ace is to be played over.

History. Rackets is a modification of Court TENNIS. It has long been popular in England and Ireland, and has been recently introduced into this country, where several clubs have been formed to play it. The New York club has a fine court on 26th Street, near the corner of Sixth Avenue.

Fives, a kind of Rackets in which the palm of the hand is used instead of the racket. There is only a front wall in the court, the others being replaced by lines drawn on the ground. In Italy is played a kind of Fives called *Pallone*, in which the ball is struck with the arm, protected from wrist to elbow with a guard of heavy leather.

RAILROAD BAGATELLE. See BAGATELLE.

RAIN STORM, Imitation of. Boil Canada balsam in a flask, over an

alcohol lamp. Clouds of turpentine drops will form in the upper part of the flask, and if a cold glass rod be inserted, these will condense and fall like rain.

RANK AND FILE, a SOLITAIRE game of CARDS, played with two packs. The first eleven cards are laid, as they appear, in a row on the table, face upward, and the rest of the cards in similar rows below as long as the pack lasts. The object is to pile the cards in families; downward from four Kings, following suit, and upward from four Aces. For this purpose such cards as are wanted are used as they appear from the pack, instead of putting them in rows. Any card in the first row can also be used, and the two right-hand cards of each of the other rows. When there is a vacancy in the first row, it is filled from the pack, but other vacancies are not filled. When the pack is exhausted, any card can be used that has no card directly below it. When a line is clear from top to bottom, any King that can be played may be placed in it. If the families cannot be completed thus, the player, beginning at the lower left-hand corner, takes up the cards in the opposite order from that in which he laid them down, and relays them, without shuffling, as at first. The cards can thus be re-laid twice; and if the families can be completed thus, the player wins.

READER, a game played by any number of persons, each of whom assumes a trade or profession, except one, who is chosen to act as Reader. The Reader selects a passage from any book, either prose or poetry, and reads it aloud, stopping at intervals to point at one of the other players. The one at whom he points must at once substitute for the next word, which must be a noun, some one connected with his assumed trade, and then the Reader goes on. Any one who does not at once respond, or puts

in a word not connected with his trade, must pay a forfeit. Sometimes the reader copies the passage on paper, calling for the words, as before, and then reading the whole aloud.

For instance, suppose the players assume respectively the occupations of carpenter, grocer, plumber, hackman, physician, and painter, and give in order, as they are required, the words italicized in the following verse, which the reader selects from Horatius at the Bridge, with this result:

"Then out spake brave *Jack-plane*,
The *flour barrel* of the *furnace*,
To every *horse* upon this *ipsecac*
Putty cometh soon or late."

REFLECTION OF SOUND, Experiments on the. Experiments on the reflection of sound at a distance are described under ECHOES.

1. It may be observed in a room by cutting two large holes in a card board disk about a foot in diameter. The disk is placed on a TWIRLER, and the experimenter, standing close to it on one side, blows a toy trumpet so that the sound will be reflected from the disk, near the top, to a person on the other side of the room. When the trumpet is blown and the disk rotated at the same time, the listener will hear a successive strengthening and weakening of the sound, resembling beats (see VIOLIN, Experiment 5). This is caused by the passage of the holes before the trumpet, letting the sound through instead of reflecting it to the listener.

2. Let one person sound the trumpet at one end of the room, while another, standing at the opposite end, holds a common palm-leaf fan before his ear. When the fan is slowly twirled by the handle, a change in the sound is heard, because it is reflected better in some positions than in others.

3. In front of a concave mirror, *r.* at *w* (see illustration) hang a watch. or support it on a block of wood.

Sound Mirrors.

Place the ear at e , in front of another concave mirror, r^* , placed at some distance. It will be found that the ticking is heard more distinctly there than elsewhere. The sound is reflected in the direction shown by the dotted lines and arrows. The point c is the centre of the sphere of which the mirror r forms a part. Ordinary chopping-bowls will do very well for mirrors, as they will reflect sound, though they do not reflect light.

REPEATING GAMES, games in which the players in turn repeat a sentence after one who is chosen leader. At each round the leader adds something, and the whole, including additions, must be repeated by all in turn, as in the child's story, "The House that Jack Built." Those who fail, either drop out of the game or pay a forfeit. Any one may invent sentences for such a game. They should be as ridiculous as possible and contain many long words. A few collections of sentences commonly used for such games is given below.

I. The following nonsense story, composed by the English actor, Foote, is very well known: "She went into the garden to cut a cabbage-leaf to make an apple-pie, when a great she-bear, coming up the street, poked his head into the shop. What! No soap! So he died, and she very imprudently married the barber, and there were present the Pickaninnies, and the Gobillilies,

and Garulies, and the Grand Panjandrum, with the little round button at the top: and they all fell to playing Catch as Catch Can, till the gunpowder ran out at the heels of their boots." This can be divided into such parts as the leader chooses, for use in the game. In the remaining games the original sentence and additions are numbered.

II. **My Aunt's Garden.** 1. "I come from my Aunt's Garden,—oh such a pretty garden! In my Aunt's Garden are four corners."

2. "In the first corner grows an elegantine—

Give me your heart, and I will give you mine."

3. "In the second corner grows a rose so fair—

I would embrace you, but I do not dare!"

4. "In the third corner grows a crimson pink—

Tell me of whom you most frequently think."

5. (Each player, after repeating the sentences, whispers a name to his left-hand neighbor.)

6. "In the fourth corner grows a poppy red—

Repeat to us all what just now you said."

7. (Each repeats aloud what he whispered.)

Another form of "My Aunt's Garden."

1. See my Aunt's Garden! Oh what a pretty Garden!

2. In my Aunt's Garden there is

a tree. Oh how pretty is the tree in my Aunt's Garden!

3. On the tree in my Aunt's Garden there is a branch. Oh how pretty is the branch on the tree in my Aunt's Garden!

4. On the branch on the tree in my Aunt's Garden there is a nest. Oh how pretty is the nest on the branch on the tree in my Aunt's Garden!

5. In the nest on the branch on the tree in my Aunt's Garden there is a bird. Oh how pretty is the bird in the nest, etc.

6. The bird in the nest on the branch on the tree in my Aunt's Garden bears in his beak a billet with the words, "I love you." Oh how pretty are the words "I love you" on the billet in the beak of the bird, etc.

III. The Key of the King's Garden.

1. I sell you the key of the King's Garden.

2. I sell you the string that holds the key of the King's Garden.

3. I sell you the nail where hangs the string, etc.

4. I sell you the beam, in which is the nail, etc.

5. I sell you the rat that gnawed the beam, etc.

6. I sell you the cat that killed the rat, etc.

This can be continued at the pleasure of the Leader.

IV. The Good Little Man.

1. I sell you my good little man.

2. I sell you the house of my good little man.

3. I sell you the door of the house, etc.

4. I sell you the lock of the door, etc.

And so on at pleasure.

V. One Old Ox.

1. One old ox, opening oysters.

2. Two toads, totally tired, trying to trot to Tewksbury.

3. Three tame tigers taking tea.

4. Four fat friars fanning the fainting fair.

5. Five fairies fending fireflies.

6. Six soldiers shooting snipes.

7. Seven salmon sailing in Solway.

8. Eight elegant engineers eating excellent eggs.

9. Nine nimble noblemen nibbling nonpareils.

10. Ten till-tinkers taking twopence.

11. Eleven electors eating early endive.

12. Twelve twittering titmice teetering on the tip-top of a tall tree.

VI. The Good Fat Hen.

1. A good fat hen.

2. Two ducks and one good fat hen.

3. Three squalling wild geese, two ducks, and one good fat hen.

4. Four plump partridges, three squalling wild geese, etc.

5. Five hundred Limerick oysters, four plump partridges, etc.

6. Six pairs of Don Alphonso's tweezers, five hundred Limerick oysters, etc.

7. Seven hundred Macedonian horsemen drawn up in line of battle, etc.

8. Eight cages of Heliogabalus sparrowkites, etc.

9. Nine sympathetic, epithetic, didactic propositions, etc.

10. Ten helioscopic, periscopic, pharmaceutical tubes, etc.

11. Eleven flat-bottomed fly-boats floating from Madagascar to Mount Prunello, etc.

12. Twelve European dancing-masters sent to Egypt to teach the Egyptian mummies to dance and sing, etc.

A kind of repeating game called GENTEEL LADY is told about in an article by itself. QUEEN DIDO, and the games like it, are also repeating games, but the things repeated are motions of the head and limbs, instead of words.

RESEMBLANCES. See WHAT IS MY THOUGHT LIKE.

REVIEWERS, THE. See BOOK NOTICES.

RIBBONS, a game played by any

number of persons in a circle, each one of whom holds one end of a ribbon, all the other ends being united in the hand of the leader of the game, who stands in the centre of the circle. When he says "Pull," they must let go, and when he says "Let go," they must pull the ribbons. Any one obeying the leader's order is obliged to pay a forfeit.

RICH MAN, a game of CARDS played by three persons with a EUCHRE pack. The player who cuts the lowest card deals, and is called Rich Man. He gives himself 11 cards and each of the others 10, turning up the remaining card as trump. Each of the other players in order, beginning at his left, may then demand of him a card with one more pip than some one card in the asker's hand, and if the dealer have it, he must exchange with the asker. For instance, if a player have a Nine, he may ask the dealer to exchange a Ten for it. Suits are not mentioned. If the dealer have two or more Tens, he would be allowed to give whichever he chose. If he have not the card asked for, he says so, and the next player asks, no one being allowed a second chance. In case the cards are exchanged, the third player must not see of what suits they are. Play then begins, the eldest hand leading. Suit need not be followed, but the trick must be taken if possible. Court-cards have no rank and cannot win, and a trick composed entirely of them is always taken by the leader. The highest plain card of the suit led takes the trick, unless an equal one of the same color has been played, when Diamonds always take Hearts, and Clubs take Spades. If Hearts or Spades are trumps, the trump suit is highest in its own color; but a trump has no power to take unless led or played to a trump lead. There is therefore no "trumping in." After the fifth trick is taken, the dealer is allowed to play the trump card,

but he cannot take it in hand. The winner of each trick scores one, and the dealer scores two additional points, but 3 points are forfeited for each failure to take a trick when possible, and 3 points by the dealer for withholding a card in the beginning of the game, if he has it.

RIDING. The art of riding can be acquired by practice only, but instruction from a good master is worth its cost. In this country the American, English, and German styles are all practised.

The German style is rapidly passing out. The American style is generally practised in the Western and Southern States, while in the Middle States the English style has become the fashion. The Germans teach to sit with a straight, stiff body, shoulders well thrown back, toes up and turned partly out, and heels well down, the back of the calf of the leg gripping the horse tightly. The American style is to ride with the body in an easy position, the toes lower than the heels, the knees grasping the saddle firmly, and the toes, only, in the stirrup. The English style is a natural position of the body, the foot thrust all the way into the stirrup, the toes slightly lower than or on a level with the heel. The American style is suited to riding easy-gaited horses only, or on military saddles, while the English style is suited to park riding as well as to rough riding and hunting.

The saddle and bridle should always be examined before mounting. See that the throat-latch (the strap under the throat) is loose enough to easily pass your four fingers between it and the throat; that the curb-chain hangs in the chin groove and is loose enough to pass a finger between it and the jaw, whilst the bit hangs naturally; that the saddle rests where it would lie easiest before fastening the girths: neither high up on the shoulder nor so far back that it will work forward;

Double Bridle.—A, Cheek ; B, Cheek of snaffle head-piece ; C, Throat-latch ; D, Nose-band ; E, Front ; F, Snaffle, or Bridoon-bit ; GG, Curb-bit ; H, Curb-chain ; I, Lip-strap ; KK, Snaffle-reins ; LL, Curb-reins ; M, Head-piece.

that the girths are not crossed or wide apart, and that they are tight, but not so tight as to give the horse pain.

The snaffle-bit, used alone or with the curb, should be high enough in the mouth to touch its corners, but not wrinkle the skin ; the curb an inch and a half below the corner of the mouth.

To Mount. 1. Stand on the left side of the horse near his shoulder, the body three quarters facing him, the right shoulder farthest from him ; take the reins up in the right hand and place them in the left. Grasp a lock of the mane with the left hand a little forward of the shoulder in such a manner as may be most convenient, meanwhile holding the reins firmly but not pulling upon the horse's mouth.

2. Now take the stirrup in the right hand, putting the left foot into it. If you can take it without the use of the hand, so much the better.

3. Put the right hand well over on the right side of the cantle of the saddle (pressing downward to help prevent the saddle turning).

4. Rise with a good spring from the right foot.

5. Throw the right leg over, clearing the horse's back, withdrawing the right hand at the same time, and sink gently into the saddle ; release the mane ; turn the right foot inward and you will easily find the stirrup. (The *forward* end of stirrup as it hangs, should be turned *away* from the horse in putting the foot in.) Lengthen the reins in the left hand by letting them

slide through the fingers or by pulling them through with the right. If a whip is carried, grasp it in the palm of the right hand, butt up.

Another method of mounting is 1, to stand opposite the saddle-girths;

above. This method does away with removing the support of the right hand as the leg is thrown over the horse's back. After one has learned to ride it is well to practise mounting from the right side, reversing the methods given above.

To Dismount.

Grasp the mane near the shoulder with the left hand, which also holds the reins; place the right hand on the right skirt; to dismount, withdraw the right leg from the stirrup, and whilst the saddle slides the back to and grasp the reins at the descent.

When being mounted is by the rider's foot on the horse's side, but oftener treatment, or allowing the horse to rush off the moment he is mounted: he should always stand a few seconds before you are ready to get on the ground, say "whoa" and take the reins with the right hand. Check him, then let them go, and the fingers to position the horse to mount only half-way, drawing the leg over, and so the ground to quiet him. Get on whilst he is moving, and often be made to shorten the right rein by pulling his head to the left, holding it there until

English Saddle.—A, Pommel; B, Cantle; C, Skirt; D, Flap; E, Panel; F, Stirrup; G, Stirrup-leather; H, Roll; I, Dee, for fastening hunting-flask; K, Staple, for fastening breast-plate; LL, Girths; M, Tread of stirrup.

2, grasp the pommel of the saddle with the right hand, which also holds the reins; 3, take the stirrup in the left hand and insert the foot; 4, take a lock of the mane, half-way up the neck, in the left hand, thumb uppermost; 5, then proceed to get on as described

mounted. A simple way to make him stand, if very restive, is to let the groom pick up his off fore-leg and hold it close to the horse's elbow. Some horses do not like to have their heads held by a groom while being mounted and will be quiet so soon as released.

The Seat. Sit without putting the feet into the stirrups, the weight of the body resting on the buttocks; shoulders back; elbows close, though not pressed to the body; the thighs grasping the saddle; the

The Seat.

legs, below the knees, hanging perpendicularly, and back far enough to cover the girths; toes slightly in; the side of the calf of the leg and the inside of the knee will then be found to grasp the saddle; the whole body at ease. A strong grip at the knee and with the inside of the calf is as important as the thigh grip and is easily secured by turning the toes well in. The foot should be nearly parallel with the horse's body. The shapes of different men require modifications in the seat, but a good rule to bear in mind is "toes in and heels down." The length of the stirrup-leathers should now be regulated so as to make the bottom of the iron hang about an inch higher than the hollow of the foot just in front of the heel of the boot, when "the seat" will remain as above described, excepting a slight throwing forward and raising of the knees. The

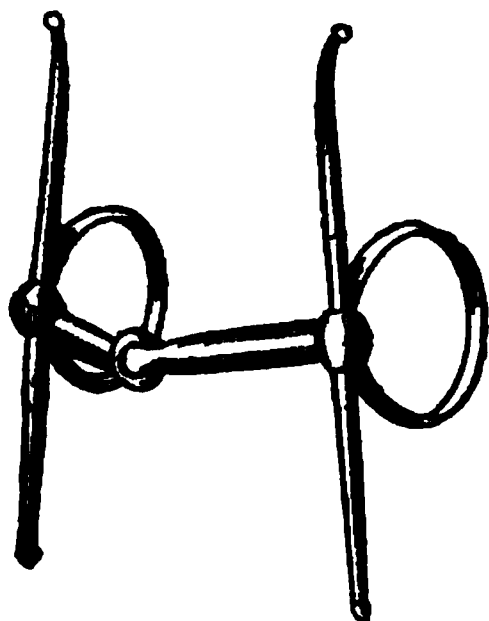
length of stirrup, however, must be regulated, *somewhat*, by the feeling of comfort after trial. Having once ascertained this length it will be found convenient to measuring from the fitting on the buckle of the latter, of course, being stirrup-bar of the saddle arm-pit, with the stirrup under the arm. See arm-pit the bottom comes, and thereafter point in mind, the rider whether his stirrups right length before any saddle.

One of the quickest "balance" and to "down" into the saddle on a pad a few times, ride without the stirrups gentle horse in a ride possible; or, if no be available, have the

with the bridle and fasten to it a rope twenty or twenty-five feet long; let an attendant hold this and cause the horse to trot in a circle and at the same time retain control of him.

It is a good plan to practice riding without stirrups (crossing them over the front of the saddle). In road or park riding the stirrups may be under the ball of the foot. In hunting or rough riding the foot should be pushed "home," that is, as far into the stirrup as it will go. Never use too small stirrups; there is danger of the foot catching in case of a fall. Stirrups with broad "treads" (the bottom where the foot rests) are the most comfortable. Do not ride the same horse upon all occasions; frequent changes give ease and security to one's seat and teach general management.

In first rides, only a snaffle-bit



Snaffle-bit.

and a single pair of reins should be used, one rein being held in each hand. Any horse fit for a beginner will start upon the rider moving and loosening the reins and pressing the heels slightly. To turn, pull the rein on the side in the direction toward which you wish to go. If intending to turn, do not commence pulling until quite ready to change direction. Do not raise the elbows or hands in turning. To stop, slightly raise and draw in the reins, ceasing the pull

as soon as the horse stops. Most Southern and Western horses are trained to guide by simple pressure of the reins on the side of the neck opposite to which it is desired to turn, and all well-trained saddle-horses should be so trained.

Having become accustomed to the motion of the horse at a walk, he may be made to trot by steadying the reins, leaning slightly forward and pressing the legs against his side, clucking to him, or touching him lightly with the whip if necessary. There are two methods of riding at the trot: the close-sitting, and rising in the stirrups. In the former, the rider gives himself up to the motions of the horse, holding the body and legs without stiffness. It is possible for the rider who has attained good "balance" to sit upon most trotting-horses without being thrown noticeably from the saddle, though on a rough-gaited horse it is very fatiguing.

In "rising to the trot," the rider partly raises himself and is partly thrown up from the saddle at every other step of the horse, using the knee as a pivot, aided by a slight pressure upon the stirrups. This rising is easily acquired, but must only be attempted when the rider feels the rise to be in accord with the step of the horse. Do not allow the legs from the knees down to swing backward and forward; nothing is more awkward. Keep the head and shoulders well back. Be careful not to throw the waist forward at each rise: it is better even to throw the head and shoulders forward to overcome this most awkward fault.

The Canter is an acquired form of slow galloping. When a horse begins to canter, he turns himself a little to one side, that he may advance the fore-leg he is going to "lead" with, and he may be made to take this gait from a walk or slow trot, by lightly pulling and raising the rein, at the same time touching him

with the heel, pressing with the leg behind the girths and throwing the greater part of the weight of the body on the side opposite the one it is intended to have him "lead," and causing him to increase his speed, at the same time curbing him. If the rider wishes him to start off with the right leg, the left rein must be slightly tightened and the left flank touched, and *vice-versa*. In cantering in a circle or on a short curve, the horse should always lead with the inside leg, that is, the leg toward the centre of the curve. The reins should be held firmly but gently.

Mr. E. L. Anderson, a modern authority, holds that "if the horse is lightened in front (that is, made to raise his legs by a 'play' of the bit) he may be lightened more upon one side than upon the other by increased action of the bit upon that side." He therefore advocates that if we wish "to make the horse gallop by leading with the right side, we shall lighten that side by a 'play' of the right rein, and bend the croup by an application of the left spur."

In the canter and gallop the body should not be held stiffly from the waist upward, but move with the horse.

The Gallop is a natural pace, and consists of a succession of leaps, in which the legs of one side leave the ground after, but pass beyond, the legs of the other side. The horse "leads" or starts to gallop as in the canter, and may be made to "lead" as described above.

In riding the gallop, the rider's body is thrown slightly back, the knees hold the horse's sides firmly, but not too tightly, and the hands are held low. In fast galloping the rider sometimes stands in the stirrups, holding by the knees to the saddle flaps, and bending forward from the waist. The canter and gallop are easier for women, if the horse lead off with his right

foot; but he should be made to lead off sometimes with the right, and sometimes with the left.

Holding the reins, Fig. 1.

Holding the Reins. If only one pair of reins is used, they should be held in the left hand, by placing all the fingers between them but the forefinger, and then turning the ends under that finger and grasping them between it and the thumb. If it is desired to shorten the hold, the grasp can be loosened, the end taken in the right hand, and the left hand pushed up. In holding the reins thus, the thumb should be pointed forward, the little finger near the pommel, and the elbow close at the side. The right rein is now the upper one, and either it or the left can be pulled at pleasure by simply turning the wrist, without lifting the hand.

When the rider has gained experience, and rides with two pairs of reins, different styles of holding them are adopted. The following is one of the most common:

Holding the reins, Fig. 2.

The snaffle reins are held in the left hand, separated by the last three fingers and coming out between the forefinger and thumb, the curb reins being held in the same hand, the near rein between the third and fourth finger and the off between the second and third, the ends coming out between the ends of the snaffle reins. Some riders place the curb reins on the outside and the snaffle reins inside, arranging the fingers as above. All the reins may

well up toward the knuckles and the hands firmly closed. As a rule, the hands should be held low and not far forward: about over the pommel of the saddle will give pull enough to control the average horse and yet not look awkward. The learner should avoid depending on his reins to hold himself on his horse, and should be able to keep his seat without their aid.

Leaping.—A horse can be taught to leap by leading him over a bar, say, sixteen feet long, supported in any convenient manner. At first the bar should be held so low that he can step over it, and gradually raised until it will be necessary for him to jump. Care should be taken not to force or frighten him. Four or five leaps in a day are enough. When a horse is well trained he will jump moderate obstacles either from a stand still or a walk. After he has learned to jump with the leading rein, he may be mounted and put through the same course. He should not be punished for refusing unless he be a rogue. A nervous horse should be handled gently, and caressed and rewarded after his lesson, which should be ended after a jump, never after a refusal. In jumping from a standstill or walk, the rider first pulls lightly upward on the reins, speaking, and pressing his legs to the horse's sides to force him forward. As he rises, the rider bends slightly forward; but when the horse is in the air, he leans back, both to keep his balance and to receive the shock of landing without being pitched forward, resuming the erect position as the horse's hind legs reach the ground. This leaning back may be learned upon a gentle horse by raising the right hand and throwing it back as if to slap him on the hind quarter as he rises. The reins are held not too tightly till the horse's fore-feet strike the ground when they are tightened to give him support. In the leap from the trot or canter the rider takes nearly

Holding the Reins, Fig. 3.
SS, Snaffle-reins; CC, Curb-reins.

be carried in the right hand in the same manner if desired. Some riders hold the reins as in figure 3. If it is desired to ride with both hands, the reins being in the left, the right hand (which holds the whip, butt uppermost) may be placed in front of the left hand and take the right snaffle rein between the first and second fingers, the thumb under it, not removing it from the left hand. Or both the right curb and right snaffle may be taken in the right hand as in Fig. 1, removing them from the left hand or not, as desired. These methods may be practised with reins or pieces of tape before taking a riding lesson. After a little practice, the rider can pull on which ever rein he wishes. Either the curb or snaffle may be the tight, or riding, rein at will, but it is not well to ride with both tight at the same time. The reins between the fingers should be held,

the same position as in the gallop, but not leaning forward as in the standing leap. The bit is used only to direct the horse to the object over which he is to jump, the tension being eased just before he rises, that he may extend his neck, and resumed, as he lands, to steady him. If sluggish, the horse may be touched with the whip or spur, behind the girths, before he comes to the jump, but not at the instant he takes it, nor should he be encouraged by a cry, or by doing anything that might cause him to swerve. A horse can make a flying high leap best when he approaches it in a slow gallop, and the rider should never attempt to make him jump at so great a speed that he cannot collect himself for the leap. A high speed also prevents the horse from deciding where he should begin the leap, and confuses him. Only very expert riders are warranted in interfering with a horse in taking his jumps; most horses jump best if allowed to "take off," or leave the ground, as they please, the rider only steadying them a little if they rush at the obstacle. There is a great deal of nonsense in the idea that a horse can be "lifted" and "helped" over his jumps; and it is usually novices, or very young persons, who attempt these feats: one might as well try to "lift himself by his boot-straps," as to "lift" a horse over a jump. If the horse is sluggish, he must be enlivened with whip or spur, or by moving the bit in his mouth; but not the *instant* he is to "take off" the ground. The rider must not pull his horse as he rises, nor whilst he is in the air—to do so shortens the jump: if the rider cannot sit the jump, after a few trials, without the support of the reins, he had better improve his seat before continuing the sport.

In training a horse to jump, he should be made to leap only a few times at first, as he uses muscles not usually put to a strain, and,

moreover, will learn to dislike it if made tired. Horses seem to like jumping in the field with the excitement attending the hunt, but some of the best judges say they never like it: they certainly dislike being "schooled," and jumping in cold blood. Always save your horse in hunting: take the fewest jumps necessary, and go through a break in the fence, or through a gate, when you can. Ease your horse in going over plowed ground, or up hill. If waiting at a "check," dismount and loosen your girths, and shift your saddle an inch either way.

Balking. If a horse refuses to move, or balks, wait quietly for a minute and he will often go on. Sometimes he can be made to go by moving the reins gently, and urging him with voice or whip; sometimes by pulling him around in the direction which he least resists; or, often by turning him around, sharply and quickly, a number of times (thus confusing him), and then starting in the desired direction. A little dirt from the road put into his mouth often so distracts a balky horse's attention from his obstinacy that he will move on.

Rearing. The young horse is apt to rear if pulled and excited. When he rises, loosen the reins, even if you must hold on by the mane or neck; press the legs closely to him, well back: this has a tendency to bring his hind legs forward, and experts often use spurs, applied well back, to bring him down. Try to keep him moving either forward or in a circle, and pull his head toward either side if he is about to rise. If he is about to fall backward, try to throw yourself off to one side. A confirmed rearer is too dangerous to ride.

Shying. Shying is sometimes caused by near-sightedness, or other defect in the eyes, but it is generally the result of habit arising from bad breaking. If from the latter cause

it can usually be overcome; if from bad eyesight, never. In riding a shy horse, the first requisite is that "the rider shall not shy himself."

He should not let the horse know that he is expecting him to shy, as he communicates his timidity to the animal, who loses confidence in both himself and his rider. Whilst the rider should be on his guard, he should not, by change of seat or reins, lead the animal to think something is about to happen as he approaches an object: he should ride straight ahead, apparently paying no attention to the object or the horse. If he shys or sheers from freshness, keep him in a straight line by pulling his head toward the object and giving him pressure with the leg on the opposite side. If he stops or turns around, make him go, even if you must whip him (*behind* the girths), especially if his shying be a mere pretence. If the object be really frightful much kindness should be used, with firmness. A steady rein and plenty of "nerve" in the rider will usually overcome shying, as the horse gains confidence in himself through his confidence in his rider. He should not be *forced* to face an object which really frightens him. He may be gotten to pass it by turning his head from it, and pressing him on the side *toward* which his head is turned. If the object is moving toward the horse it is best to turn his head from it and his side toward it, stopping him, or moving gradually, until the object has passed.

Horses will often pass an object and not shy at a similar one again, if given a chance to examine it and touch it with the nose after being gently gotten up to it. Never whip a horse for shying *after* he has passed the object, as he will soon acquire the habit of running after each shy, as he expects the whip.

A horse may often be made to pass an object without shying by quietly pulling his head away from

it as he begins to notice it, and thus attracting his attention to something else: he cannot think of two things at the same time.

If a horse is evidently confirmed in the habit, he is not fit to ride, and should be disposed of and put to work where he can do no harm.

Bolting. If a horse bolts, or rushes from control of the bit, loosen the reins a moment and give them a sudden jerk, or sharply "saw" him: that is, pull the reins alternately on either side *quickly* and *sharply*, keeping his head up.

Some authorities say that by gathering the reins so short in the left hand that it presses against the mane, and then passing the right hand down (on either side as close as possible to the bit and pulling the horse's head quite around to one side, any bolter may be stopped. It is best to stop the horse, if possible, so soon as he starts faster than the rider wishes him to go, before he has gotten into the running stride. But if he does run, try to keep your seat; and if there is a road, let him go until he begins to re, and then give him a sharp cut until he is run out of the road.

In some cases the horse will pass through the object without shying, though some animals are vicious by nature.

The rider should seldom use his whip to punish his horse, and the spur should never be so used. But when the whip is used for punishment, it should be sharply applied two or three times. If used to make the horse go forward when backing, it should be taken in the right hand, and a sharp cut be given over to the left side, behind the saddle girths, and brought back very quickly on its rebound, and struck on the right side, behind the girths. To do this expertly requires some practice off the horse, but it is worth the time, as it does not give the pain on one side only, and cause the animal to swerve. Skilled riders advise that a contest

between the horse and his rider always be avoided, if possible, by turning the horse's attention to something else. Never strike on the shoulder, as the horse naturally draws back, or swerves, from the blow.

A bad rider sometimes punishes his horse for not understanding what he is wanted to do, when the fault is with the rider himself, who either does not know how to make his desire known, or does not do so clearly. A well-trained horse is always willing to obey, and does so the moment he understands. To punish him for not understanding is usually one step toward making him vicious. Authorities differ much on the subject of training horses, but it is safest to err on the side of kindness. A rider who does not lose his temper has a great advantage. A nervous horse with high courage may be a perfect saddle-horse in the hands of a self-controlled rider, and useless in those of a cruel, loud-voiced one.

In country-road riding, always pick the softest paths; and if the road be macadamized, ride on the edges. Ride slowly on descents, with shoulders back, and walk your horse down hills.

Pulling. Many horses pull, when first leaving the stable, from lack of work, and soon calm down. Some horses of a nervous disposition pull through anxiety to go ahead: such animals can be ridden with comfort only through gentle treatment and light hands. Often they will not pull *unless pulled by the rider*. Easy bits, such as a snaffle, bar, either rubber covered, should be used alternately, every few days. Horses with low, heavy shoulders, carrying low heads, are apt to pull, and are not fit for saddle use. If a horse with a good mouth begins to pull and bear down upon the bit, it will often be found that his feet are becoming contracted or "sore," or that he is stiff in his front legs. This

bearing upon the bit is an effort to transfer a part of his weight.

A good veterinary should be consulted in such a case.

Hands. A rider is said to have "bad hands" when he continually pulls at his horse's mouth. "Good hands," or "light hands," seem to be natural with some riders, and almost impossible to cultivate in others. Women oftener have good hands than men, perhaps because they are not as strong and are more sensitive. Often a woman can ride with ease a high-strung nervous horse, which may be a puller, or even a run-away, under a rough-riding man. The rider must learn to "give and take" with the reins. If the horse pulls, use force enough to bring him to the pace required, aided by a kindly and quietly spoken word, like "there," or "walk" (but not "whoa," which should always mean stop), and then gradually loosen the reins. Always hold the reins tightly in the hands, whether pulling or not.

Unless great force is required, hold the fore-arms at right angles to the body, with the hands downward at the wrist, as in playing a piano. It will be found that there is strength enough at the wrists for the control of most horses,—certainly for well broken ones,—and that the hands will grow "light" as they "give and take" from the wrist with the motion of the horse's head whilst in action. If a horse bears down upon the bit, his head may be brought up by raising the hands and moving the snaffle reins sharply and quickly from side to side; or, if he is persistent, by raising either hand with a sharp pull upwards, ten or twelve inches.

If the tendency of the horse is to carry his head too low, carry the hands somewhat high. If he has the opposite tendency, carry the hands low.

Spurs. No beginner should wear spurs: they are a source of danger

except when worn by experienced horsemen, and no rider who turns his toes outward should put them on.

Stumbling. A stumbling horse should never be ridden. The fault may arise from some curable disease of the feet, but usually from weak knees or legs. If mounted on a stumbler, keep his head up and make him move at a lively pace by aid of whip or spur.

Bits. Most horses go well with the double bit; that is, the curb and snaffle or bridoon, as shown in the picture of the bridle. But some horses with very tender mouths or nervous dispositions go better with the snaffle alone; it may be used with two reins, but without the extra head-piece (B) in picture. A few horses go well with the curb, but dislike the additional mouth-piece of the snaffle. For these the Pelham bit may be used.

Pelham Bit.

Riding Hints to Girls. A girl should not ride every day, and long, until she is sixteen, unless she have a second saddle, with the pommels on the right side, to enable her to sit on different sides of the horse on alternate days. In very young girls the muscles are weak, and the spine and shoulders may grow crooked. No girl ought to ride unless she likes to and is fearless. A horse quickly knows if his rider is afraid and soon becomes master. A

woman's saddle should have a *flat* seat (Martin & Martin, of 5th Avenue, New York, who have their workshop in London, or Peat & Co., Piccadilly, London, make them). The stirrup should be plain, or of the kind shown on the saddle illustration, not the old-fashioned slipper. Riding should be practised without using the stirrup: it gives great confidence, balance, and freedom. Of course it is not intended to recommend long rides without a stirrup; but only practise during exercise in the school or at some safe spot. The rise to the trot can be done without it, and should not depend too much upon it: by grasping the upright-head firmly with the right leg and pressing the left knee against the leaping-head, or lower pommel, the rise can be accomplished with the slightest aid from the stirrup, and in fact should be so ridden.

To make the horse canter, leading with his right leg, pull his head slightly to the left with the left rein and press him quickly with the left heel. To make him lead with the left foot pull the right rein and tap him with the whip, behind the girths, on the right side, where the heel would touch him if on that side.

A woman or girl, in mounting, should place her right hand on the upright-head, and her left foot in the left hand of an assistant, held about 16 inches from the ground. She places her left hand on his right shoulder, and his right hand is under her left arm-pit. The assistant counts one, two, three. At three, she springs upwards, the assistant aiding her by rising. Being on the saddle, she places her right knee over the upright-head. The assistant sees that her left foot is placed in the stirrup and fastens the elastic straps for holding the skirt in place. In dismounting, after first releasing the right leg and the dress from the pommel and turning from the for-

ward position, she holds her arms at her sides and simply slips off the horse, her assistant placing a hand under each elbow, thus bringing her down lightly. Women should keep

ball of rubber or stuffed cloth. The players form a circle, each standing near a base, which is usually a stone. The bases are at equal distances; the size of the circle may be large or small, provided one standing inside it can easily throw to all the bases. At the beginning of the game any player takes the ball and throws it into the air. The one nearest whom it stops must stand within the circle. The one at his right takes the ball and throws the player in the circle. If he is hit, he also must go into the circle; if he hits, all leave their bases and run where they please. The one hit gets the ball, when he shouts "Halt!" and all must stop. In other case, the one thrown at takes the ball in turn at some one else on the circumference of the circle, but if he has been obliged to go out of the circle to get the ball, he must return inside before he can throw. The one he hits must join him inside the circle. If he hits nobody, all return to their bases. The one hit, or the one nearest the ball, takes the next turn at throwing it. So the game goes on, till all but one are inside the circle. This one now takes the ball, and running around the circle, outside, where he pleases, tries to hit those within, while they strive to get the ball and hit him. The player outside has the advantage, for he can run back as far as he wishes, while they cannot leave the ring. Those whom he hits are "dead," and must retire outside the ring. If he "kills" all without being hit himself, he is victor. But if he be hit, he and all he has "killed" must go within the circle, while the others take their stand at whatever bases they choose, and the game proceeds as before.

A, Upright-head; B, Leaping-head; C, Seat; D, Saddle (corresponding part on right of Saddle is the Flap); E, Stirrup-leather; F, Stirrup; G, Secondary Stirrup (which turns down and releases foot in case of a fall); H, K, Girths; I, Balance Girth.

shoulders and hips squarely to the front, looking straight between the horse's ears. The right leg above the knee lies flat on the saddle, while the right knee grasps the upright-head firmly. Below the knee the leg is drawn back, and the toes are bent downward. The left knee is close to the saddle, and the leg below the knee hangs easily down. The foot in the stirrup is held parallel to the horse's side.

The rules of the road in riding are the same as for driving, and should be followed very carefully, both in the park and on the road. See under article on DRIVING.

RING BALL, a game played by any number of persons with a soft

ball of rubber or stuffed cloth. The players form a circle, each standing near a base, which is usually a stone. The bases are at equal distances; the size of the circle may be large or small, provided one standing inside it can easily throw to all the bases. At the beginning of the game any player takes the ball and throws it into the air. The one nearest whom it stops must stand within the circle. The one at his right takes the ball and throws the player in the circle. If he is hit, he also must go into the circle; if he hits, all leave their bases and run where they please. The one hit gets the ball, when he shouts "Halt!" and all must stop. In other case, the one thrown at takes the ball in turn at some one else on the circumference of the circle, but if he has been obliged to go out of the circle to get the ball, he must return inside before he can throw. The one he hits must join him inside the circle. If he hits nobody, all return to their bases. The one hit, or the one nearest the ball, takes the next turn at throwing it. So the game goes on, till all but one are inside the circle. This one now takes the ball, and running around the circle, outside, where he pleases, tries to hit those within, while they strive to get the ball and hit him. The player outside has the advantage, for he can run back as far as he wishes, while they cannot leave the ring. Those whom he hits are "dead," and must retire outside the ring. If he "kills" all without being hit himself, he is victor. But if he be hit, he and all he has "killed" must go within the circle, while the others take their stand at whatever bases they choose, and the game proceeds as before.

This ball game is played in Germany, where it is called *Kreisball* (Ring Ball). In Switzerland it is

named *Eck und Krippe* (Corner and Fence), the point inside the circle where the players stand being the "*Eck*," and the circle itself the "*Krippe*."

RING TOSS. See GROMMETS.

RING TRICK. The following trick requires the use of a second ring, similar to the one borrowed; hence it is best to borrow only a plain gold ring.

To pass a ring through a table, sew a ring to the middle of a handkerchief by a piece of silk about four inches long. Borrow a similar ring, and pretend to wrap it in the handkerchief without really doing so. Then give the handkerchief to one of the company to hold. He will feel the sewed ring and think it to be the borrowed one. If there is no light from behind the performer, he may first hold up the handkerchief with the suspended ring on the side away from the company to show them that it is empty. Ask the company to choose at what point the ring is to pass through the table, and, placing a tumbler on the spot ask the handkerchief holder, keeping his hand on the ring within it, to hold it directly over the tumbler. Then drop the handkerchief over the tumbler, and ask him to let the ring go, when it will be heard to fall into the glass. Borrow a high hat, and take it in the hand holding the borrowed ring in such manner that the fingers, covering the ring are just inside the crown. The inside of the hat may then be shown to the company. Placing the hat on the floor just beneath the tumbler, the performer gently drops the ring into it and then, pulling the handkerchief with its attached ring away from the tumbler, invites one of the company to examine the hat, where he will, of course, find the borrowed ring.

ROBIN'S ALIVE, a game played by any number of persons, who sit in a circle. The one who begins

the game lights a piece of twisted paper or bit of wood and repeats the verse:

"Robin's alive, and alive he shall be;
If he dies in my hand
My mouth shall be bridled, my back shall
be saddled,
I'll be sent as a slave to Barbary."

As soon as the verse is recited the paper is handed to the next player, who also repeats the lines, and so it goes around the ring. The one in whose hand it goes out must pay a forfeit. This game is called also Jack's Alive, and each player repeats those two words only as he holds the lighted paper.

Sometimes the last line is sung,

"If it dies in my hand you may back-saddle me."

"Back-saddling" consists in placing the one in whose hand the light went out on his back on the floor, and piling chairs on him.

ROLY-POLY, or NINE HOLES, a game of ball played by any number of persons, generally nine. As many holes as there are players, each large enough to receive the ball, are dug about a foot apart, the whole forming a square. Around them a line is drawn, about four or five feet from the outside holes, and ten or fifteen feet from this line, in any direction, is marked the position of the Roller. Each player now chooses a hole, and one, selected by lot as Roller, takes his post, ball in hand. Each of the others must have one foot on the boundary line around the holes. The Roller tries to roll the ball into one of the holes. If he make three consecutive misses, a pebble is placed in his hole. If he succeeds, the player in whose hole the ball stops seizes it and throws it at any of the others, except the Roller. If he hit the one at whom he throws, the latter has his hole marked with a pebble and becomes Roller; if he miss, his own hole is so marked, and he becomes Roller in turn. He who throws the ball must stand on the boundary line as he

does so, unless he chooses to hold the ball and wait his chance, instead of throwing it at once, in which case he may stand three feet from the line. The other players must run for safety; but if the thrower hold the ball, they may save themselves from being hit by running back within the boundary line before he can strike them with the ball. If the Roller send the ball into his own hole, he must run forward and throw the ball like any one else; but as he is so far from his hole, he is at a disadvantage, and he always tries, if possible, to send the ball into some other one's hole. The first player who gets three pebbles in his hole must stand with his back to the others, usually with his face to a wall, and throw the ball as far as he can over his shoulder. The others in turn, each standing where the ball stops, may throw it at him as hard as they choose; but whoever hits him in any other part of the body than the back must change places with him. Sometimes he who has three pebbles is considered out of the game, and his hole is stopped up. This goes on until only one is left. He is the winner, and is allowed to throw the ball at each of the others, as described above, in the order in which they went out. Each throws the ball over his shoulder to determine the spot from which it may be thrown at him.

History. Roly Poly is a very old English game. It is sometimes played in England with hats instead of holes, and is then often called Egg Hat. In this case the ball is pitched instead of rolled. The French call it *Balle aux Pots* (Pot Ball) and it is called also Roll Ball. The Germans have a game called *Neunloch* (Nine Holes), but the object of the player is simply to throw his ball into the holes in a certain order. At Yale College, where the game is much played by the Senior class, it is called Nigger Baby, or

African Infant, or sometimes *Niger Infans*, which is the same name in Latin.

The scoring stones placed in the holes are often named "Babies." In Austria they are similarly called *Kinder* (children).

In a variety called *Scheiben schiessen* (Target Shooting), the nine holes are of different sizes and arranged in the form of a cross, the smallest in the centre. He who hits the centre hole first is called the King, and he who does so next is called the Marshal.

ROPE-WAVES, Experiments with. Procure a piece of rope from 20 to 50 feet long, the longer the better; but, if the experiments are to be tried indoor, the rope cannot be longer than the room used. The rope must not be at all stiff; the best kind is cotton window-cord.

1. Tie the rope to some object, such as a door-knob, if indoor, or a tree or a fence outdoors, so that it will be pretty tight. Hold the other end of the rope in the hand. By jerking it quickly downward, a downward curve or depression may be made to run along the rope to the other end, where it will be reflected and return as an upward curve. Or tie the other end of the rope to a chair, stretch it as tight as desired, and then sit on the chair to hold it. When the rope is struck with a stick, a similar wave will run along it, more swiftly the tighter the rope is; so it can be seen better in a long rope than in a short one.

2. Send a downward curve, as before, and just as it is reflected send an upward curve. The two upward curves meeting in the middle of the rope will be added, and make it swing violently.

3. Send a downward curve, and just as it starts to come back as an upward curve, send another downward curve. The opposite curves meeting in the middle of the rope will destroy each other there, so the

middle of the rope will remain nearly still, while the parts on either side swing up and down. The still point is called a "node." (See VIOLIN, Experiments on.)

4. Try these experiments with the cord stretched tight and then loose. It will be found that the tighter the cord the faster the waves travel.

5. Send an upward or downward curve, as before, and as it is reflected send a curve to meet it by striking the rope sidewise. The result will be to make the rope move in a circle when they meet.

ROUNCE, a game of CARDS played by not more than nine persons, with a full pack. The cards rank as in WHIST. Each player is dealt five cards, two and three at a time, as in EUCHRE, and an extra hand of six cards, called "Dummy," is dealt in the middle of the table. If the eldest hand is satisfied, he says "I play;" otherwise, he says "I pass," and, throwing down his cards, may either retire from the game during that hand, or take up Dummy. If he retire, the next player to the left has the same choice, and so with the others in order. After Dummy has been taken up, the others must either play their hands or retire. He who takes up Dummy discards one of its cards. If the dealer choose to play without Dummy, he may take the trump card into his hand and discard one of his own cards. Play then begins, the eldest hand leading. Suit must be followed, if possible, otherwise any card may be played. The winner of a trick must lead trumps, if he can. At the beginning of the game, each player is credited with 15 points, one of which is subtracted for every trick that he makes. If he fail to make a trick, he is said to be "rounced," and five points are added to his score. He wins whose score is first reduced to nothing. The points are often marked by crosses, as in AUCTION PITCH.

RULES OF THE GAME.

1. In cutting for deal, low deals, and Ace is low.

2. The Dummy must be dealt three cards at a time, each three being given before the dealer gives any to himself.

3. If there be a misdeal, the dealer is rounced, and the deal passes to the next player.

4. Whoever takes Dummy must play it.

5. If all the players up to the one on the dealer's right have refused to play, that one must play his hand, take Dummy, or allow the dealer to score 5.

6. If a player revoke, expose a card, or fail to lead a trump, when possible, after taking a trick, he is rounced.

In Germany this game is called *Rams*, and is played with a Euchre pack. If a player hold no trump, he is allowed to play his poorest card face down, which calls for a trump from every other player.

ROUND TAG. See FOX AND GEESE, II.

ROWING, the art of propelling a boat by means of oars. The different kinds of row-boats and oars are described in C. C. T., under Row-boat. The oarsman sits upright on the thwart, or stationary seat, with his feet against the stretcher, which should be at such a distance that the knees will be bent, but so that the hands will easily clear them. The knees are held about a foot apart, the heels close together, and the toes turned out. The handle of the oar is grasped naturally with both hands, one, called the inside hand, at the extreme end, the other, or outside hand, from one-and-a-half to two inches from it. The thumbs are usually underneath though some rowers hold the thumb of either the inside or outside hand above the oar. The rower begins by inclining the body forward, keeping the back straight and the head erect, and stretching out his arms

The Catch.

as far as possible. The oar is now dropped into the water (called the "catch") and the rower begins to pull at the same time. He should avoid both pulling before the oar strikes the water and waiting for an instant afterward. Some oarsmen hold the blade of the oar at right angles to the water as they dip it and others incline the front of the blade a little forward. The blade of the oar should be dipped just enough to cover it, and it should be kept at the same depth during the stroke.

The learner should avoid pulling

Middle of Stroke.

the blade of the oar through the air before it strikes the water, as is the usual way with beginners. The result of this fault is called "chipping," or in other words it makes the stroke short. The power should be applied the moment the oar touches the water. The blade should be dipped sufficiently deep to avoid its slipping through the water as is

the case with what is known as "surface dipping." In stretching out the arms they precede the movement of the body, both going forward together, but the hands moving faster than the body.

After pulling steadily, using the back and legs as well as the arms, the stroke is finished when the body is slightly inclined backward and the knees nearly straight. The oar is then lifted from the water, and the

Finish of Stroke.

body brought back to the first position ready to begin another stroke. This is called the "recover," and was formerly often executed with a sudden movement so as to waste as little time as possible. But oarsmen now favor a slower recover, to avoid straining the muscles of the abdomen, which are used in the movement. It has been said that the recover is really the most fatiguing part of the stroke. The hands should move forward a little faster than the body. But others make the movement with the arms first, lest they should cramp the body. At the instant the body has reached the proper position, the oar is dropped into the water and the second stroke begun. If an oarsman wait an instant before "catching," he is said to "hang," and he should equally avoid catching before he has finished going forward, thus splashing water. The oar should be carried as low as possible during the recover, the height depending on

whether the water is rough or smooth. When the beginner has learned these movements so that he can execute them without looking at his oar, which should never be done by the finished oarsman, he should "feather" on the recover. Feathering is turning the blade of the oar parallel with the surface of the water during the recover, so that the resistance of the air will be as little as possible. To feather prop-



Fig. 1.

Fig. 2.

Feathering.

erly the wrist of the inside hand should be curved a little upward during the stroke (Fig. 1) and at its

close; just as the oar is lifted out of the water, the wrist is lowered and the back of the hand thrown a little upwards (Fig. 2) so as to turn the oar blade through a right angle. Just before the catch, the movement is reversed, so that the oar is ready to take the water again. As to the rapidity of the stroke, opinions differ, but most oarsmen prefer a long and steady stroke, though some of the most successful racing crews have pulled very rapidly. The rate of stroke is determined to a great extent by the length of the race, being faster for short races. A rapid stroke is exhausting and cannot be kept up long, and it is also difficult to execute the stroke properly if it is very swift. The oarsman should keep exact time with the others in the boat. To "back water," or cause the boat to move in the opposite direction, the oarsman reverses his oar and pushes instead of pulling. The movement is made principally by the arms, the body resting in a natural position. If he is pulling a pair of sculls, the same rules apply, except that each oar is pulled by one hand. By holding the oars firmly and in exactly the same manner, the oarsman may be sure that the catch and feather are made at the proper angles without looking to see. The oarsman should be careful to pull both sculls with the same force, otherwise the boat will turn toward the weaker side. If he has no one to steer he should bring some point in the stern of the boat into line with a tree or other object on shore and then keep them in line. If the stern swerves toward the left, for instance, he must pull a little harder on his right scull to bring it back again. If he wishes to turn quickly he must back water with the oar on the side toward which he wishes to turn, and row with the other. Where several row in one boat, the steering is often done by the bow oar. Where the boat is steered with a rudder, the rudder

is managed either by the bow oar, who operates it with his feet, by an arrangement of cords and levers, or by a coxswain, who sits in the stern, and who also gives the necessary orders to the oarsmen, telling them when to begin to row and when to stop rowing. He does this because he is the only one in the boat who faces in the direction of motion. The rules to be observed by the steersman, whether he be coxswain or one of the oarsmen, are generally as follows: "Inside" means toward the shore, "outside" toward the middle of the stream.

1. Boats going with the stream or tide take the outside, and those against stream or tide the inside.

2. Boats meeting keep to the right.

3. A boat overtaking another must keep clear of it.

4. A boat with a coxswain must yield as far as possible to one without a coxswain.

5. A row-boat must give way to a sail-boat.

6. A boat with a less number of oars must give way to one with a greater number.

Sliding Seats. Almost all racing boats now use sliding seats, which add greatly to the power of the oarsman, enabling him to use the muscles of his legs in pulling. Other advantages are the fact that the body does not need to be bent forward or backward, to a position where the muscles of the back cannot be used to advantage, as in ordinary rowing; the prevention of cramp by the alternate bending and stretching of the leg, and the ability to maintain a better pace for a longer time. In a quick "spurt" the sliding seat is thought by some oarsmen to be a disadvantage, as it gains power at the expense of velocity; but some of the best authorities do not agree with this conclusion. The seats either slide on a sort of brass rails or roll on little steel balls, the object being

to make the friction as small as possible.

When the oarsman uses a sliding seat, the body begins to swing first, and then he pushes the seat back, both movements blending together, until the legs are almost straight. The swing of the body and the slide together determine the length of the stroke. The slide should not be made too soon, and for a beginner should be only a few inches, being increased as the oarsman becomes more expert.

The oar, in rowing, acts as a lever. The principle is the same as when a weight is lifted by the middle of a stick, the end resting on the ground. In the case of the oar the end rests in the water instead of on the ground, and the boat is "prized" along, so to speak, by the oarsman. The blade of the oar does not remain perfectly still, like the end of the stick on the ground, but moves through the water a little, so that some power is lost. It is evident that the oar should be held so that the water will resist its motion as much as possible.

The action of the rudder is as follows: If the boat is moving straight ahead, and the rudder is in line with it, there will be no pressure from the water on either side; but as soon as the rudder is turned, for instance, to the right, the water will press on its right side and push the stern of the boat over toward the left, which will alter the boat's direction toward the right. In the same way, turning the rudder toward the left causes the boat to turn to the left. Hence the rudder must always be turned in the direction the boat is to go. In a row-boat the rudder is usually managed by means of cords, one of which is attached to each end of a cross-piece at its top. The power should be applied to the rudder lines steadily, so as not to throw the boat to one side or the other, as is the case if the line is pulled quickly and then relaxed.

Ordinary boats are kept in the water, but the finer kinds are usually kept in a boat-house. The large boat-houses owned by college rowing associations, or city boat-clubs, usually contain, besides space for stowing away many boats, dressing-rooms for oarsmen, with a special closet or locker for each one's clothes, bath-rooms, a lounging or reception room, and often a workshop for building or repairing boats. The house is of course on the edge of the water, and in front of it is usually what is called a "float," being a floating floor, or raft, moored loosely to piles or posts, but unconnected with the house, so that it will rise and fall with the water. Such a float is indispensable where there is a tide. From the boat-house to the float lead one or more gangways, fastened to the former, but merely resting on the latter. To launch a barge or shell, the oarsmen, each on his own side and in his own position, carry it on their shoulders to the edge of the float. At the word of command from the captain, those on the side next the water slip underneath, and then all on one side, holding by the edge, let the boat gently into the water. The head of the boat usually points up stream or against the tide, though no attention is paid to this point by many crews. The outside oarsmen get in first at the command (for instance), "Hold Starboard, in Port!" The starboard oarsmen hold the edge of the boat while the port oarsmen get in, take their seats, and ship (or put in place) their oars, which are given them by an assistant. At the order "Hold Port, in Starboard!" the port oarsmen, sitting in the boat, hold the edge of the float while the others get in and ship their oars. All the oars being held in position, those on one side projecting over the water, and those on the other over the float, one or more assistants take the latter and push the boat steadily, sidewise,

away from the float. When the oars are all clear, the coxswain begins to give his orders, his first care being to turn the boat's head in the right direction. To this end he commands "Pull Number 2!" "Back water number 3!" or any similar order he pleases. When the boat is in the right position, he commands "Ready!" and an instant afterward "Give Way!"

Boat Racing. Boat races are usually held on lakes or large rivers where the water is smooth. The course is either straight away, that is, in a straight line, or with a turn, the boats going and returning over the same course. The place where the race begins is called the Start, and that where it ends the Finish. In a course with a turn, the Start and Finish are at the same point. The course is sometimes marked by buoys bearing colored flags, and each boat is assigned a definite path, in which it is obliged to keep, so that there is no danger of one's interfering with the other (called "fouling"). Eight-oared races are rowed, if possible, over a straight-away course. If a turn is necessary, each boat should have its own stake to turn, to avoid fouling. One of the best straight-away courses in the country—that at New London, Connecticut, where the annual race between Yale and Harvard is rowed—is four miles long, but the usual length is one and a half miles. The New London course is on the Thames River, which is very broad at this point, so that there is plenty of room for yachts to anchor near the Finish. The city authorities keep all boats off the river during the race, so that there is no interference with the crews. The only craft allowed behind the racing boats are the tugs bearing the referee and newspaper reporters, and the college launches, and these are all required to keep so far in the rear that they cannot interfere with the race. If such boats come too

near racing shells, the latter are held back by the suction. A railroad runs along the riverside, and a train of platform cars fitted with seats, called an "Observation train," or "Moving Grand Stand," keeps abreast of the boats, so that spectators can see the whole of the race.

The following are the rowing rules of the National Association of Amateur Oarsmen, adopted also by the National Amateur Athletic Union:

RULES.

Starting. 1. All boat races shall be started in the following manner: The starter, on being satisfied that the competitors are ready, shall give the signal to start.

2. If the starter considers the start false, he shall at once recall the boats to their stations; and any boat refusing to start again shall be disqualified.

3. Any boat not at its post at the time specified shall be liable to be disqualified by the umpire.

4. The umpire may act as starter if he thinks fit; where he does not so act, the starter shall be subject to the control of the umpire.

5. Boats shall be started by their sterns, and shall have completed their course when the bows reach the finish.

Water. 6. A boat's own water is its straight course, parallel with those of the other competing boats, from the station assigned to it at the start to the finish.

7. Each boat shall keep its own water through the race, and any boat departing from its own water will do so at its peril.

8. The umpire shall be sole judge of a boat's own water and proper course during the race.

Fouls. 9. It shall be considered a foul when, after the race has commenced, any competitor, by his oar boat, or person comes in contact with the oar, boat, or person of another competitor; unless, in the

opinion of the umpire, such contact is so slight as not to influence the race.

10. No fouling whatever shall be allowed; the boat committing a foul shall be disqualified.

11. The umpire may, during a race, caution any competitor when in danger of committing a foul.

12. The umpire shall decide all questions as to a foul.

13. A claim of foul must be made to the umpire by the competitor himself, and, if possible, before getting out of his boat.

14. In case of a foul, the umpire shall have the power—(a) To place the boats (except the boat committing the foul, which is disqualified) in the order in which they come in; (b) to order the boats engaged in the race, other than the boat committing the foul, to row over again on the same or another day; (c) to re-start the qualified boats from the place where the foul was committed.

Accidents. 15. Every boat shall abide by its accidents, except when, during a race, a boat while in its own water shall be interfered with by any outside boat, the umpire may order the race to be rowed over, if, in his opinion, such interference materially affected its chances of winning the race.

Assistance. 16. No boat shall be allowed to accompany a competitor for the purpose of directing his course or affording him other assistance. The boat receiving such direction or assistance shall be disqualified at the discretion of the umpire.

Umpire. 17. The jurisdiction of the umpire extends over the race and all matters connected with it, from the time the race is specified to start until its final termination, and his decision in all cases shall be final and without appeal.

18. The judge at the finish shall report to the umpire the order in which the competing boats cross the line, but the decision of the race

shall rest with, and be declared by, the umpire.

19. Any competitor refusing to abide by the decision, or to follow the directions of the umpire, shall be disqualified.

20. The umpire, if he thinks proper, may reserve his decision, provided that in every case such decision be given on the day of the race.

21. Contestants rowing a dead heat shall compete again after such interval as may be appointed, and the contestant refusing to so row shall be adjudged to have lost the race.

Turning Races. 22. In turning races, each competitor shall have a separate turning stake, and shall turn from port to starboard. Any competitor may turn any stake other than his own, but does so at his peril.

Juniors. An oarsman who has never won a race, nor pulled in one with those who have done so, is called a junior, and special races are sometimes held in which only juniors are allowed to row. Competitions with members of his own club, however, are not considered to affect an oarsman's standing as a junior.

Rowing Machines. Many machines have been devised to give to an oarsman, indoors, the same practice that he would get in a boat. In the simplest of these he sits on a sliding seat and pulls on a handle about 18 inches long, to which is attached a cord running over a pulley and fastened to a weight beneath the floor. This does not exactly represent rowing, however, for the weight exerts a constant pull, whereas the resistance of the water to the oar is not the same at all points. The weight, too, assists in the recover, while the oar does not. In the best rowing machines real oar handles are so arranged that pulling on them operates a piston in a cylinder filled with water, or

Rowing Machine.

winds up a spring as in the one shown in the illustration. The Yale and Harvard crews now practice rowing during the winter in real boats in large tanks of water in their gymnasiums.

History. In ancient times the largest vessels were propelled with oars arranged in rows called banks, one above another. Boat-racing was not uncommon among the Greeks and Romans, and Virgil describes a race in the fifth book of the *Æneid*. The illustration opposite shows a Greek rowing vessel, or galley, as it is pictured on an ancient monument. In the middle ages large galleys in use on the Mediterranean sea, were manned by slaves and criminals who had been condemned to row in them as a punishment. The ancient Britons used boats of wickerwork covered with skins, called coracles, which they propelled with paddles, and similar craft are still to be seen in Wales. Alfred the Great introduced long galleys from the Mediterranean into England for use in war. In early times, before the introduction of carriages, rowing

was a very common means of transit for kings and nobles in England, and by the 12th century large numbers of men were employed on and about the rivers as watermen. In 1514 they had become so numerous that laws were passed for their regulation. At the present time the watermen are employed chiefly on lighters and steam-boats. The earliest record of boat-racing in England is of the establishment of a prize by Thomas Doggett, an actor, in 1715, to celebrate the anniversary of the accession of George I. to the throne. It was to be rowed for annually on the Thames by six young waterman's apprentices, and consisted of a red coat with a large silver badge on the arm. This prize, called "Doggett's coat and badge" is still competed for by the Thames watermen. In 1775 a rowing-race, called a regatta (Italian *regata*) was held on the Thames, in imitation of similar contests or festivals held in Venice, and since that time rowing or sailing contests have been commonly called by this name. Early in the present century clubs began

Greek Galley.

to be formed for pleasure rowing, and about the same time it was taken up as a sport by the English public schools and universities. Eton had a crew in 1811, and in 1817 beat the watermen in a four-oared race. In 1829 the first race was rowed between Oxford and Cambridge, on the Thames, and since 1856 these two universities have rowed every year. Since 1839 there has been also a great regatta annually at Henley-on-Thames. In this country amateur rowing began at about the same time as in England, but it did not become popular so soon. The first recorded race was between crews from New York City and Long Island, in 1811, and took place with four-oared barges with coxswains on the North River. The New York boat, the "Knickerbocker," won. The first regular amateur boat club in America—the Castle Garden Amateur Boat Club Association, was organized in 1834. At the present time there are hun-

dreds of such clubs, most of which are banded together in rowing associations for the purpose of giving yearly regattas. The largest of these, the National Association of Amateur Oarsmen, was formed in 1873.

The first American College boat club was formed at Yale in 1843, and the next at Harvard in 1844, and the two colleges rowed their first race in 1852. Since that time they have met almost every year, sometimes alone, and sometimes in connection with other colleges. A list of all the intercollegiate races held up to the present time, with the times of the contending crews, is given in the Appendix.

Since the introduction of boat-racing, the racing-boat has been greatly changed. At first it was 35 feet long and 6 feet beam, and weighed 700 pounds. The oars were clumsy, of great size, and loaded with lead at the handle, while the blades were wide and flat. As early

as 1828 rude wooden outriggers were attached to boats, but the outrigger as it is now used was invented by Henry Clasper, of Newcastle, England, who built his first boat with them in 1844. The sliding seat and the swivel rowlock were both invented by Americans. The former was devised by J. C. Babcock, who put one, in a sculling-boat in 1857, but the device was not perfected till 1870, nor generally adopted till several years later.

At Oxford and Cambridge there are a large number of boat clubs, which compete every year for the honor of being what is called "the head of the river." As the rivers on which they row are too narrow to allow boats to pass easily, the shells are arranged in a line at equal distances apart. The object of each is to strike against, or "bump" the

boat in front of it, and when this is done, the bumped boat yields its place to the other. This is repeated several times, and the boat that wins or keeps a place at the head is the victor. This arrangement is not necessary in any of the American colleges where boating is practised, for all of them row on wide bodies of water. At Yale and Harvard each class has its boat club, and there is a class regatta twice a year. These regattas, like the "bumping races" at the English universities, serve to train oarsmen for the University crews. For an eight-oared University crew 15 or 20 men are usually selected several months before the race, and the necessary eight are picked out from among these afterward, when it has been seen who are the best.

Many substitutes for oars, in pro-

French Velocipede Boat.

PELLING a boat, have been proposed, and some of them actually used. Most are on the principle of the paddle-wheel, and are worked like a tricycle. The illustration shows one invented by a Frenchman. The swan-boats in Central Park, New York, are propelled in this way, and the Prince of Wales has one of a similar kind at his estate of Sandringham.

ROYAL STAR, a game played by any number of persons, with an

eight-pointed wooden star, and eight wooden balls. The rays of the star are arranged so as to fall out if struck by the balls, and each ray is of a different color, the balls being painted to correspond. The players take turns in throwing the balls at the star. Each scores one point everytime he hits a ray with a ball of a different color, two points when he hits one with a ball of the same color, and has three points deducted from his score when he misses the

star altogether. Each player throws all the balls before the next takes his turn, and the game ends after a number of rounds previously agreed on. The game may be played with counters, when, instead of having points taken from his score, one who misses is required to place three counters in the middle of the table.

These, with others paid in like manner, form the pool, which is taken at the end of the game by the player having the highest score.

RUSHING BASES. See PEELAWAY.

RUSSIAN BACKGAMMON. See BACKGAMMON.

S

SADDLE MY NAQ, a game played by any number of persons. Sides are chosen, and the leaders decide by lot who shall have first innings. The losers arrange themselves as follows: One stands almost upright, but bending slightly forward, his hand resting against a wall or tree; a second puts his head on the back of the first; a third in like manner on the back of the second, and so on, till all on that side are in line. Each player may hold to the clothes of the one in front of him, cross his arms on his breast, or rest his hands on his knees. One of the other players now runs, places his hands on the back of the one at the rear of the line, and leaps as far forward as he can. The rest of those on his side follow in order, until all are on the backs of the other side. If all can remain on without touching the ground with any part of the body while the leader counts twenty; or if any of the other party sink down under their weight, or touch the ground to support themselves, the riders keep their innings and the game is repeated. Otherwise the sides change places.

SAILING. The hulls of boats are of various sizes and shapes, but all have the forward end (called the bow) sharp, that it may cut through the water. The ~~after end~~, called the stern, is fitted with a rudder, with which the boat is steered. This rudder, which is the same in principle as that of a row-boat (see

ROWING), is managed in small boats by means of a handle or lever, called a tiller; when the tiller is pushed to one side, the rudder turns to the opposite side; and (as explained under ROWING) as the boat turns to the same side as the rudder, the tiller must be moved to the side opposite to that in which the steersman wishes the boat to go. The right-hand side of the boat, as one faces the bow, is called the starboard side, and the left-hand the port side (formerly called larboard). To "port the helm," or "put the helm to port," means to push the tiller toward the port or left side, thus turning the boat to the starboard or right. Large boats are generally steered with an upright wheel connected with the rudder by ropes, cogs, or otherwise. Small boats are sometimes entirely open, but generally half-decked, and larger ones usually have a covered cabin. The bottom of a boat's hull, called the floor, may be almost flat, or it may be more or less curved. The depth of a boat below the water's surface is called her "draught." If this distance is two feet, for example, she is said to "draw two feet of water." Of course the draught is greater if the boat be loaded. The difference of draught between the bow and stern of a boat is sometimes called the drag. It is the best plan to ballast or "trim" small boats so that the stern sinks a little deeper than the bow.

The boats called cutters draw a

great deal of water, and are narrow and sharp at the bottom. This kind of boat is much liked in England. Most American yachts are broader and draw less water, and

one kind of boat, the sharpie, is almost flat-bottomed. Some sail-boats have a keel, or ridge of wood running from bow to stern on the outside of the hull at its bottom,



Section of Hull of an English Cutter.

and others have a centreboard, a flat board which is let down at one end through a slit in the middle of the boat. Still others, generally small boats, have a leeboard, which is let down at one side. All these devices are meant to prevent the boat from drifting sidewise, so that she will move most easily forward. Sail-boats usually have rowlocks at the side so that they can be rowed when there is no wind.

The arrangement of masts and sails constitutes the "rig" of a boat. The area of the sail in an ordinary boat should not much exceed the length of the boat multiplied by its extreme breadth. In most boats the sails are hung to spars or poles, which are raised and lowered on the mast by ropes called halliards. If the spar hangs across the mast, it is called a yard, and the vessel is said to be square-rigged; but only large

craft, like ships and brigs, are rigged in this way. Pleasure boats are generally fore-and-aft rigged, that is, the spars are fastened to the mast by one end, and the sail is therefore all on one side of the mast. The bottom of the sail is fastened to a longer pole, called a boom. In all boats the rope by which the sail is controlled is called the sheet. The tackle by which it is managed by

the sailor is shown in the illustration.



Tackle of Main-Sheet.

One of the simplest rigs is the spritsail, which is nearly square. There is no boom, and in place of the gaff a light pole, called a sprit, fastened at the lower end, or "foot,"

to the middle of the mast, and at the other end to the upper corner of the sail. The side of the sail toward the mast (called the luff of the sail) is laced to it with cords, and the foot of the sprit rests in a loop of rope. When the foot is taken from the loop, the sail can be folded up against the mast and tied to it. The mast is usually made, in this case, so that it can be taken down or "unstepped" and laid in the bottom of the boat. The sheet is fastened to the lower outer corner of the sail. Such a sail may be used on an ordinary row-boat or on a CANOE.

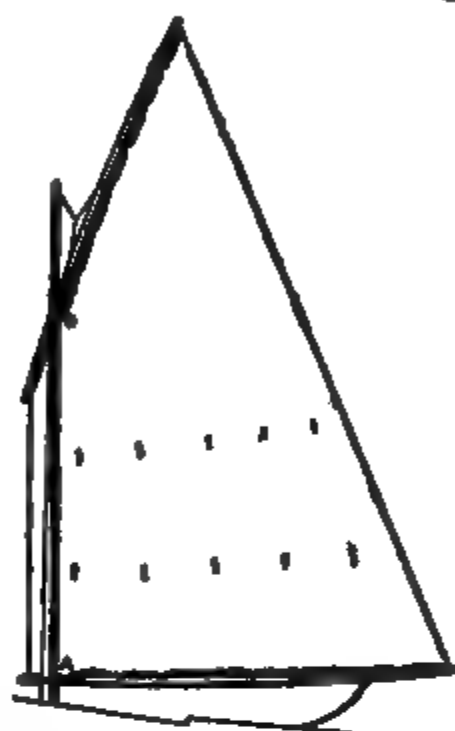
Another simple rig is the "leg-of-mutton," a triangular spritsail, having its sprit nearly at right



Device for Unstepping Mast.

angles with the mast, and therefore taking the place of a boom rather than of a gaff, as seen in the picture. The mast used with a sprit- or leg-of-mutton sail is sometimes made so that it can be unstepped by the boatman without his leaving his seat. The device used is plainly shown in the illustration. Another simple rig, called the balance-lug, is shown in the next illustration.

The most common rig for ordinary sail-boats is the cat-rig, and



Balance-lug.

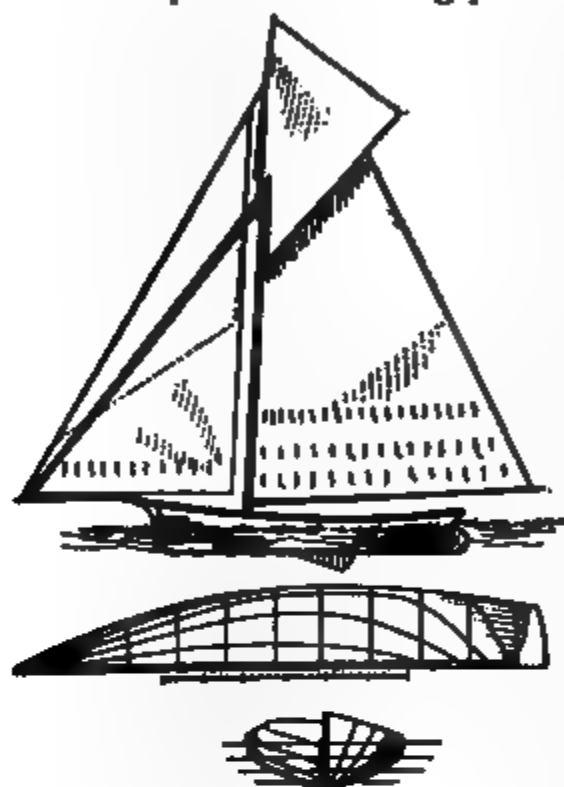
boats thus rigged are called cat-boats (in England Una boats). The



Cat-boat.

sail, which is like an ordinary main-sail with gaff and boom, is hoisted to its place by halliards, of which there are usually two, one to raise the outer end of the sail (called the peak), and one the inner corner (called the throat). The sheet is fastened to the boom. The sail, which slides up and down the mast

by means of hoops or rings, is generally fitted with two or three rows of short ropes called reefing-points,



Sloop-rig. Sail, Plans, and Lines.

by which its size may be lessened in case the wind blows strong.

This is done by letting down the sail and tying one or more of these rows of ropes on one side of the sail to corresponding ropes on the other side. When the lower row is thus tied, the sail is said to be single-reefed; and when the second row, is used double-reefed. Cat-boats are usually broad, draw but little water, and have centre-boards. As they have but one sail, they are more easily managed and safer than other boats, and are therefore the best kind for boys.

The sloop-rig differs from the cat-rig in having a jib in addition to a mainsail. The mast is set a little farther aft, to make room for a bowsprit, a spar projecting from the bow, with a rope called a stay extending from its end to the top of the mast. On this stay the jib, which is fitted with rings on one edge, is pulled up and down by means of the jib halliards. Sometimes more than one jib is used, in which case the others are called the jib-topsail and flying-jib. Sometimes in a light breeze a large jib, called a bal-

Yawl.

loon-jib, is used. The jibs are also called headsails. Sometimes a spar called a jibboom is fastened to the end of the bowsprit and projects beyond it, when many headsails are carried. In addition to the main-

sail, sloops often carry above it a topsail, called, from its position above the gaff, a gaff-topsail, and in light winds another triangular one called a spinnaker, fastened to the mast and spread at the foot by a boom. All these are shown in the illustration.

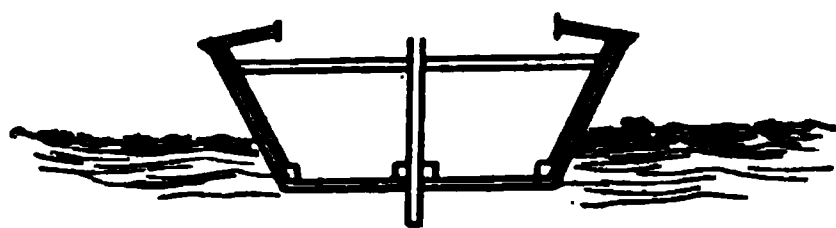
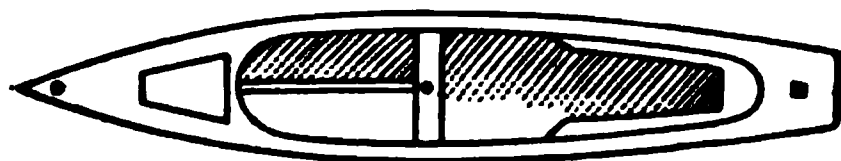
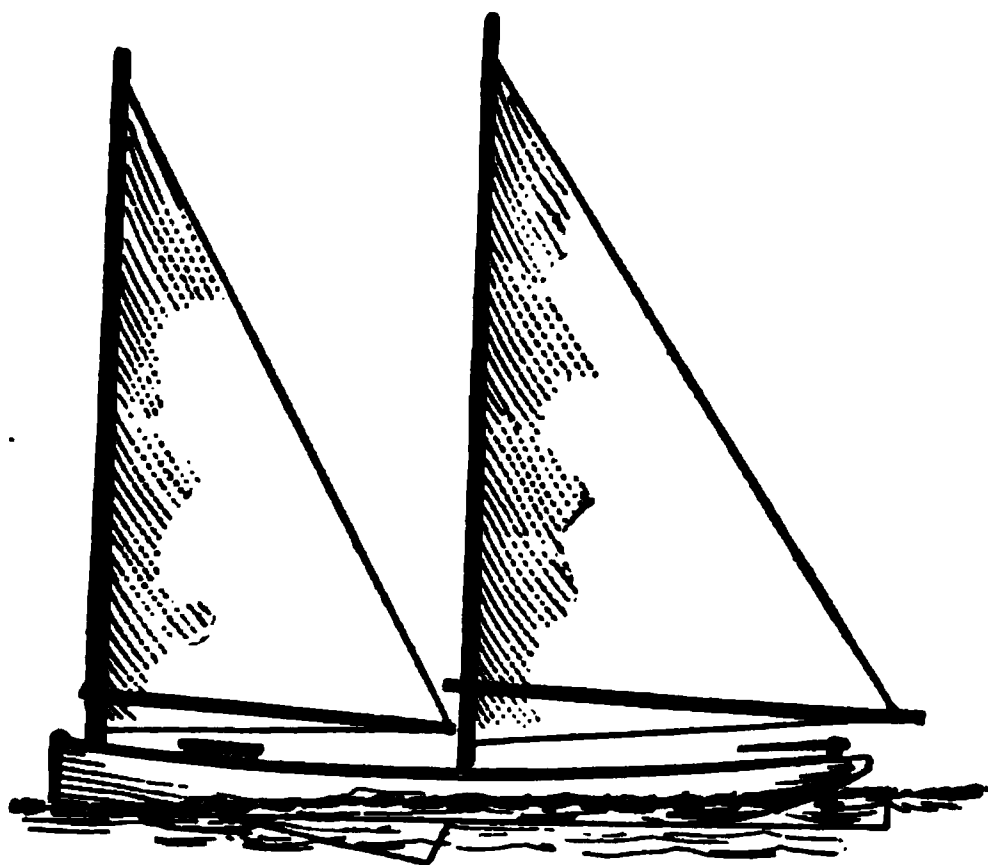
The yawl, in addition to the sloop-rig, has a "jigger," or small mast, at

tom of the boat. It usually consists of pieces of iron or lead, or bags of gravel or sand. Ballast helps to prevent capsizing, and permits the boat to carry more sail. In small boats it is often shifted from one side to the other in tacking, which will be explained below. All cutters have keels, but the ordinary American sloop may have either a

keel or a centre-board. Cutters may have a deep cabin entirely below the deck, but in the centre-board sloop part of the deck must be raised to give the necessary depth beneath it, and in cat-boats, except large ones, there is no room for any cabin at all. The cat-boat is decked at the bow and stern and around the sides, having an open space in the middle called the cock-pit.

A narrow, flat-bottomed boat, called a sharpie, is much used on Long Island Sound and about New York, and a similar craft, called a pound boat, is popular on the great lakes. There are one or two masts, usually with a leg-of-mutton sail, though the pound boat has two sails, like a small sloop's mainsail. Large sharpies with jibs and a small mast in the stern are called Ros-

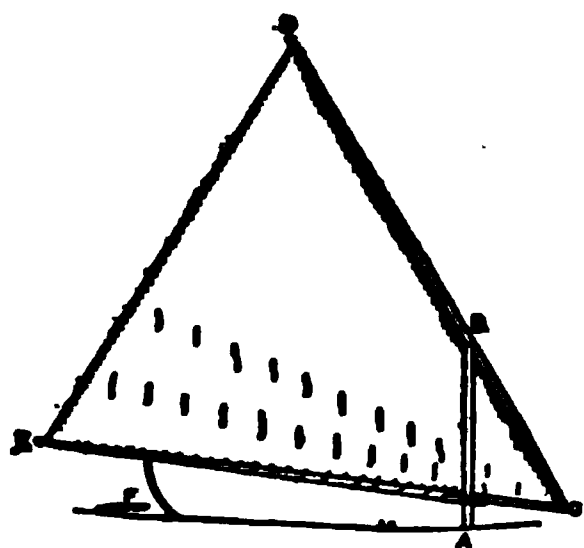
lyn yawls, after the home of the designer, Thomas Clapham, of Roslyn, Long Island. The lateen rig, which is shown in the next illustration, is mainsail and jib in one. It is not much used except on small boats like canoes. The kind of sail-boat used, and its rig, depend much on the water in which it is to sail. A boat for use on smooth sheltered water would not be appropriate for the open sea, and *vice versa*. For rivers and small lakes, a boat of wide beam



Sharpie.

the stern. The boom of the mainsail is short, to make room for this new mast. As has been said, the English sloops called cutters are narrow and draw a great deal of water. To keep them upright in the water they are loaded with lead at the keel, sometimes with many tons' weight. This is called outside ballast. Nearly all boats are obliged to carry ballast of some sort, but it is generally inside ballast, that is, it is placed in the bot-

and light draught is needed, with a small sail, on account of the sudden flaws of wind common on such waters. The sail may be a leg-of-



Lateen.

mutton, a balance-lug, or something similar. For bays and arms of the sea a larger boat of greater draught is proper, with a mainsail, or jib and mainsail.

A vessel like a raft, which can move in any direction on the water, will always drift before the wind, but if the vessel have a keel, or a centreboard, so that it moves most easily in one line, it will move chiefly in that line, no matter in what direction the wind is blowing. If

the boat could not drift at all sideways, it would not move at all if the wind were at right angles to it. All boats drift more or less, but the object of the keel and centreboard in sailing-boats is to reduce the drifting as much as possible. At first we shall suppose that the boat cannot drift at all sidewise. In Fig. 1. supposing a sail, S, to be set up directly across the boat; if

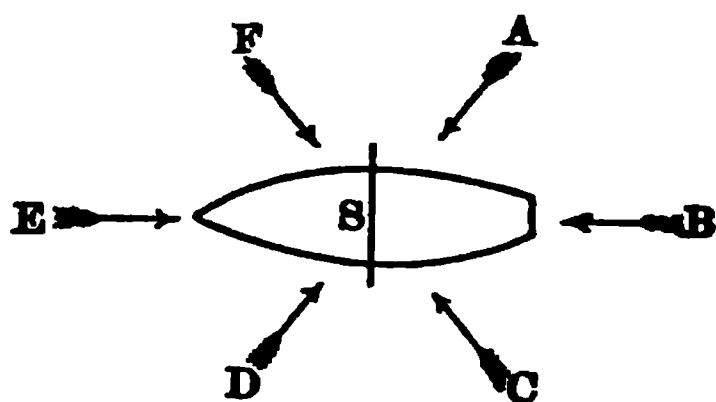


Fig. 1.

the wind were blowing in the direction A, B, or C, the boat would move forward; if as at D, E, or F, backward, since it cannot move sideways. Now the force of the wind always presses squarely against the sail, no matter if it is blowing at an angle. Thus, in Fig. 2,

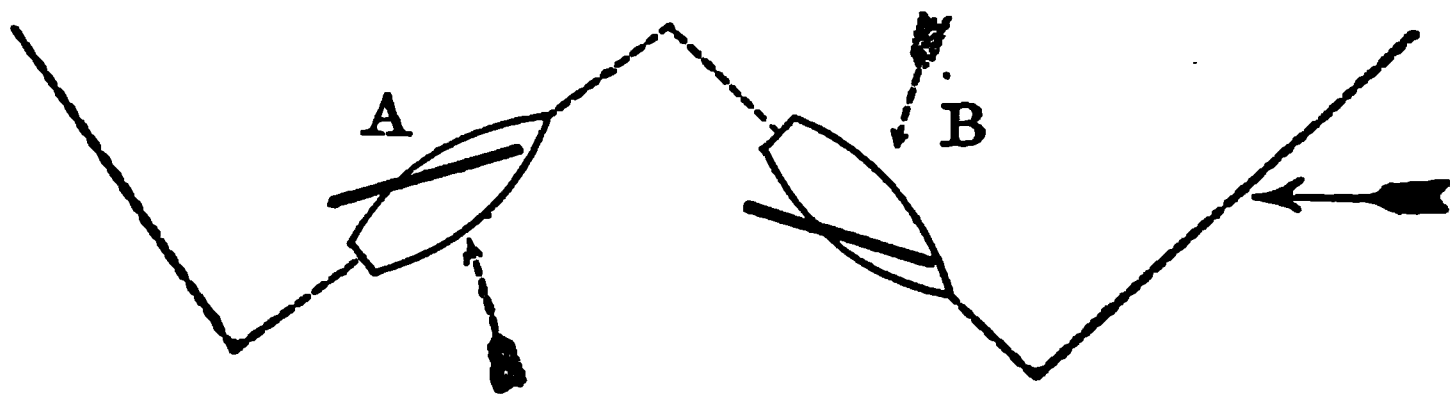


Fig. 2.

if the wind is blowing with the large arrow, and the sail is turned as at A, the wind will act just as if it were blowing with the dotted arrow, only with less force. As the boat can move only forward or backward, it will go forward, since the force is in the rear of the sail. Now, if the boat and sail be turned as at B, the effect of the same wind will be as if it blew with the second dotted arrow;

the boat will move forward at another angle, and by turning to and fro, following the dotted path, it will make progress, on the whole, in the direction from which the wind is blowing. This turning from one side to another, in a zig-zag path, is called tacking, or beating to windward. When a boat is headed nearly against the wind, it is said to be sailing "close to the wind." If a boat did not

drift at all sidewise, it could thus sail almost directly against the wind; but drifting prevents this. The closer the course is to the wind, the more force there is to make the boat drift, and the less to move it forward. To be able to sail close

to the wind is a great advantage in a boat, as will be seen from Fig. 3. The boat A, which can sail closer to the wind than B, has to tack less and can follow a shorter path in going from X to Y.

When the boat tacks, the wind

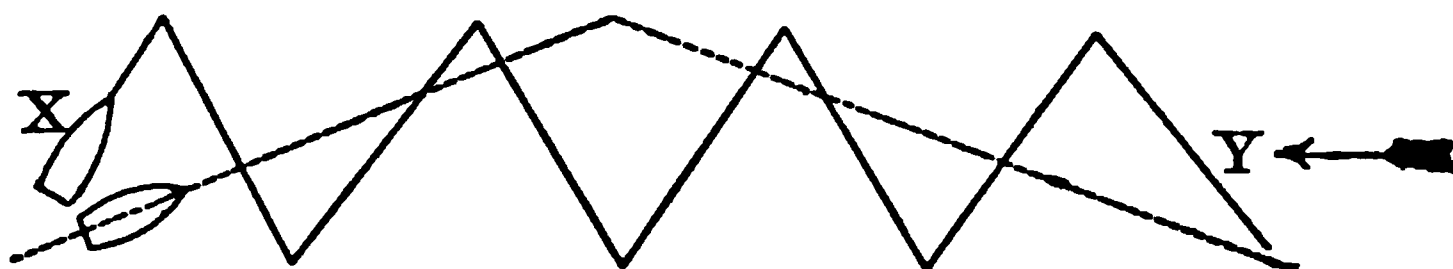


Fig. 3.

strikes on the opposite side of the sail, and swings the boom to the other side of the boat. The more closely to the wind the boat is sailing, the more nearly in a line with the boat the sail must be. This is arranged by hauling aft the sheet. When the boat is running before the wind, the sheet is so fastened that the sail is nearly at right angles with the boat. When the boat is headed directly toward the quarter from which the wind blows, the sail will swing directly to the rear of the mast, and the boat is said to "come to," or "heave to." In this position the only effect of the wind will be to drift the boat slowly backward. The art of managing a sailboat is best learned from one who is skilled in it. The sailor sits on the windward side of the tiller, so as to manage it better. (Windward means the direction from which the wind comes, and leeward that toward which it blows.) If he is sailing to windward he must watch the edge of the sail next the mast. If it shivers, or flaps, that is a sign that the boat is too close to the wind, and the tiller must be pulled a little to windward (called putting the helm up). This will turn the head of the boat a little farther from the wind so that the air will fill it smoothly again. When ready to tack, or "go about," he should push the helm to leeward

(called putting the helm down or "a-lee"). This will turn the boat's head so that she first comes into the wind and then as she continues to turn, the wind will presently strike the opposite side of the sail, and it swings across the boat, which then starts away on the other tack. The helm must be pushed down gently that the boat's headway may not be stopped, and the sail will swing over easily. The learner should not try to sail too close to the wind, nor have his sail "trimmed too flat," that is, too much in line with the boat. In sailing to leeward the helmsman watches the outer edge of the sail (called the leech). If it begins to flap he should either let the sail out farther by "paying out" the sheet, or put up the helm. In sailing to leeward, if the course requires the sail to be swung over from one side to the other, it is most safely done by turning the boat quite around, so that the boat is close to the wind as the sail swings, just as in tacking. Another way is by "jibing," which is done by hauling in the sail slowly, and at the same time putting the helm up till the sail is perfectly flat, then letting out the sheet and allowing the sail to swing out on the other side. The object is to prevent the wind's catching the forward side of the sail suddenly and blowing it over quickly, which might

capsize the boat. Jibing is dangerous because the sail swings over so violently that it is apt to carry away the rigging or capsize the boat. It should be avoided if the wind is blowing hard, and it is more safe to loosen or "ease off" the peak halliards a little first. Care must be taken that the boat does not jibe by accident, when sailing before the wind. A change in the course without letting out the sail so as to keep the wind at its rear; or the dipping of the boom into the water so as to swing it back, may have this result. When the wind is blowing fresh, the sail is often reefed, as explained above. When a sail is to be reefed it has to be lowered before tying the reefing points. If the wind blows very hard, the boat should be brought into the wind, and sometimes it may be necessary to lower the sail. In reefing, the points of a second or third reef should never be tied till those of the preceding ones are secured. This is to enable the sailor to let out the reefs one by one, as soon as the boat is able to carry more sail.

Landing. In making a landing, the boat's head is always brought into the wind, and the boatman must therefore land on one side or another of the dock, according to the direction of the wind.

RULES.

When sailing among other craft the following rules, which are universally observed, must be borne in mind:

1. Boats on the port tack must keep clear of those sailing on the starboard tack. In all cases of doubt the boat on the port tack must give way.

2. Boats sailing before the wind must give way to those going on either tack.

3. In case two boats are sailing before the wind, the one having the wind on the port side must keep out

of the other's way. (The side on which the boom is settles the question as to direction of wind.)

4. If both have the wind on the port side, the windwardmost must give way. But in any event the overtaking boat must keep clear of the one it is overtaking.

5. If two boats meet, both must put their helms to port.

6. In a race, if two boats approach a shore or buoy, and the one to leeward has not room to tack so as to clear the other, and yet would be in danger by keeping on her course, she must hail the other, which must tack at once. The leeward boat must tack as soon as there is room to do so.

NAUTICAL TERMS.

In ordinary conversation, these should generally be pronounced as spelled but sailors have their own pronunciation (indicated in parenthesis), which is commonly used on board a boat.

Abaft. Toward the stern.

About, To go. To go on the other tack.

Beam. The greatest width of the boat.

Beating. Tacking to windward.

Belay. To fasten a rope to a cleat by winding or twisting it around.

Bend. To fasten, as a sail or rope, to a boom or yard.

Bobstay. A rope extending from the end of the bowsprit diagonally downward to the cutwater.

Boom. A spar to keep the foot of a sail stretched. The word is the same as beam.

Brails. Ropes to assist in furling sails. From the old French *bracioul*, a leather breeches-band.

Broach to. To come up quickly into the wind when running before a heavy sea.

Cat's Paws. Little puffs of wind.

Clews. The lower corners of sails.

Cockpit. The place where the passengers sit in a partly decked boat.

Combing. The raised board surrounding the cockpit.

Close-hauled. Sailing as close as possible to the wind.

Close to the wind. Nearly in the direction from which the wind is blowing.

Crank. Easy to overturn, opposed to *stiff*.

Cringle. A loop of rope, either plain, or made around an iron ring, and attached to a sail. Cringle means a ring.

Down, To put the helm. To push the tiller to leeward.

Down-haul. A rope to pull down a sail.

Draught of water. The depth of the lowest part of the boat beneath the surface of the water.

Foot. The lower edge of a sail.

Fore. Forward.

Fore-and-Aft. Lengthwise of the boat.

Foremast. The forward mast of vessels having more than one mast.

Foresail (fóre-s'l). The principal sail on the foremast of a fore-and-aft rigged vessel.

Furl. To fold a sail and lash it to the boom or mast.

Gaff. The spar to which the upper part of a fore-and-aft sail is fastened. From the French *gaffe*, a long pole with a hook, used in fishing.

Gasket, a rope for lashing a furled sail to the spar or mast. From the French *garcette*.

Grapple. A small anchor having several claws. From *grapple*.

Grommet. A ring of rope or metal. Derived from the French *gourmette*, curb-chain.

Gunwale (gún-nel). The topmast board or plank that forms the side of a boat.

Halliard, or Halyard. A rope for hoisting a sail. Derived from haul and yard.

Hawser, a large rope. From the German, *haltseil*, hold-rope.

Hawse-hole, or Hawse-pipe. A hole through which passes the haw-

ser or chain that holds the anchor.

Head. The top of a sail.

Helm. The steering apparatus. From the Anglo-Saxon, *helma*, rudder.

Hoist. The part of a fore and aft sail that slides up and down the mast.

Jibs. Triangular sails set on ropes reaching from the foremast to the bowsprit.

Jibboom. A spar extending from the end of the bowsprit.

Jibe. To swing the boom from one side to the other, while sailing before the wind.

Jigger. The small mast in the stern of a yawl, also called the mizzen.

Keel. A timber running from bow to stern at the bottom of the boat. From the Anglo-Saxon *ceol*, keel.

Keelson, (kél-son). A timber running over the keel above the floor-timbers.

Knot. A nautical mile (in the United States 6,080½ feet), so called because it is the distance between two knots on the log line, by which distances at sea are measured.

Larboard (lár-burd). The left-hand side of a vessel (looking forward) now generally replaced by the word "port," to avoid confusion with "starboard." It is probably contracted from *lowerboard*, because the left side was considered inferior in rank.

Lee, or Leeward (loó-ard). The side toward which the wind blows, originally a place sheltered from the wind. From the Anglo-Saxon *hleō*, a shelter.

Leech. The after-edge of a fore-and-aft sail. Probably from the Latin *licium*, a thread.

Luff. The forward edge of a sail. To luff, or luff up, is to steer close to the wind. Luff may be from the German *luft*, air.

Mainmast. The principal or largest mast.

Mainsail (máin-s'l). The large sail of a cat-boat or sloop.

Miss Stays. To fail in trying to tack.

Mizzenmast. The after-mast in three-masted vessels.

Off. Away from the point from which the wind blows, as in "Keep her head off."

Peak. The point of the sail at the outer end of the gaff.

Port. The left-hand side of a boat looking forward (see *Larboard*).

Rake. Inclination, as "the rake of a mast," "a raking stern-post." Masts are usually given a rake aft to bring their weight and that of sails and rigging farther aft. The word is from the Anglo-Saxon *raecan*, to reach.

Ratlines. Ropes fastened across the shrouds, making ladders by which the sailors in large vessels can climb to the masts.

Reef. To fold part of the sail and fasten it together in order to lessen the surface exposed to the wind. The folded part of the sail is called also the reef. From the Anglo-Saxon *reaf*, a garment.

Rig. The arrangement of masts, sails, and ropes in a boat. From the Anglo-Saxon *wrigan*, to cover.

Rigging. The ropes of a boat, divided into standing rigging, the rope used to strengthen the masts, and running rigging, the ropes used to work the sails.

Serve. To wind yarn or cloth around a rope's end to prevent its ravelling, or around any part to keep it from wearing away by rubbing.

Sheet. A rope fastened to the lower outer corner of a sail or to the boom, to haul it in and keep it in place. From the Anglo-Saxon *Sceotan*, to cast or extend.

Shrouds. In large vessels, ropes extending from the head of the lower mast to strong timbers at the sides of the vessel. They serve to strengthen the masts. See *ratline*.

Slack. Applied to a boat with a tendency to turn her bow from the wind, owing to improper construction.

Spar. A general term for masts, yards, booms, gaffs, and the like.

Spinnaker. A large triangular sail used by sloops in a light wind.

Splice. To fasten the ends of two ropes by interlacing the strands. It is nearly the same word as "split," the strand being pulled apart.

Sprit. A light spar extending from the middle of the mast to the outer corner of the sail, used in place of a gaff. From the Anglo-Saxon *spreot*, a spear or pike.

Starboard (stár-burd). The right-hand side of a boat (looking forward). From the Anglo-Saxon *steoran*, to steer, and *bord*, a border.

Stay. A rope to steady a mast, extending diagonally forward from its top. Stays also extend between the masts and from the upper masts to the sides.

Staysail (stay-s'l). A sail spread on a stay.

Stem. The upright timber at the end of a vessel's bow to which the ends of the planking are fastened.

Stern. The rear end of a boat. From the Anglo-Saxon *stearn*, a helm, because the helm is placed there.

Stiff. Keeping upright, opposed to crank; a boat is stiff when the wind makes her incline very little. Applied to a wind or breeze, stiff means strong.

Tack. The lower fore-corner of a fore-and-aft sail, or a rope attached to that corner; also the direction of a boat when sailing to windward. A boat is on the starboard tack when the wind is on the starboard side; on the port tack when the wind blows against the port side. A boat is said to tack in changing from one tack to another. Tack means to fasten. The first meaning is the original one, the other being derived from it, as the tack holds the corner of the sail when the wind crosses it obliquely.

Taut. Tight.

Tarpaulin. Tarred canvas, from

tar, and *pauling*, provincial English for the covering of a cart.

Topsail. The second sail above the deck.

Tiller. The rudder handle; from the provincial English *tiller*, the handle of anything.

Trysail (try-s'l). A small fore-and-aft sail.

Throat. The inner concave end of the gaff or boom, which fits around the mast.

Topping-lift. A rope to hold the end of the boom clear of the cabin, in a large boat.

Up, To put the helm. To put the tiller to windward.

Vangs. Ropes to steady the gaff in a large boat, running from its peak to the sides of the boat. From the Dutch *vangen*, to seize.

Wear. To turn the boat so that the wind will be on the other side, without tacking, the bow being turned away from the wind, and the sail jibed over.

Weather. Windward, toward the wind.

Weather-helm. A boat is said to have a weather-helm when the tiller must be kept to the weather-side.

Wind. The direction from which the wind is blowing; used in "bringing a boat's head into the wind," "turning her head out of the wind," "toward the wind," "away from the wind," etc.

Windward. The direction from which the wind blows.

Yaw. To go out of the proper course. From the provincial German *gageln*, to totter or shake.

Knots. Some of the simplest kinds of knots are described in C. C. T. Besides these, the following are useful. They are described in this article because they are used so often on a sail-boat; but every one should understand how to tie them.

In making a knot, any bend or loop in the rope is called a "bight" (Anglo-Saxon *bige*, a bending). The

part of the rope not bent in making the knot is called the "standing part." Some knots are made purposely very tight, so that they will last forever, and others are made to be easily untied.

The Plain Overhand Knot (see C. C. T.) may be made at the end of a rope, either to prevent its untwisting, or to keep it from passing through a hole. For it may be substituted the *Figure Eight* (see C. C. T.), which is easier to untie than the plain overhand.

Boat Knot. An overhand knot whose end is not passed through the bight, but secured by a spike or piece of wood on withdrawing, which the knot unties at once.

Square or Double Knot. This is formed of two overhand knots, and is the most common knot for fastening two ends together, but it is made incorrectly by most people. The right way to tie it is shown

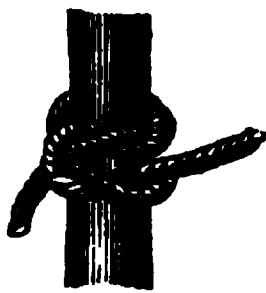


Fig. 1.

in Figure 1, and the wrong way in Figure 2; it will be seen that in the former the bight on one side passes over both ropes and on the other side under both, whereas



Fig. 2.

under the other. When it is tied properly a strain on it only makes it hold more tightly, and yet it can be loosened at once by pulling the bights apart. It is secure only when the ends tied are of the same sized rope. This knot is sometimes called a reef knot, as it is used for fastening the reef points.

Bowline. This forms a loop which cannot slip, and is useful in a great number of ways. It is shown in C. C. T., but as it is important, the method of tying it is described here in more detail. A

loop is made and the end passed up through it as in Fig. 3, and then the end is passed over the rope above the loop and through the loop from behind, as in Fig. 4. When the knot is tightened, it will not slip. By pulling the rope



Fig. 3 Fig. 4

in a bight through the loop thus formed, the best slip noose is made. This is called a "running bowline." A "bowline on a bight" can be made in the middle of a long rope when it must be done immediately, and there is no time to find an end, as when a rope is to be thrown to a drowning man. The rope doubled is first tied, just as in Fig. 3 (see Fig. 5.), but then



Fig. 5.

the end *c* is pulled apart and brought down over the bight, as shown by the dotted lines.

Knots for fastening ropes to hooks, spars, or rings are often "hitches," or "bends."

One of the simplest hitches is a *half hitch*, shown in C. C. T.

A *timber hitch*, shown in Fig. 6, is useful for fastening a rope to a post in a hurry.

It holds tight under a strain, but it loosens as soon as it is relieved.

Fig. 6.

Clove hitch. This is shown in Fig. 7. The coils thus made are thrown over a post and drawn tight, or the end of the rope may be twisted around the post as shown in Fig. 8, where the end *a* is represented as fastened to the standing part with a half hitch.

Blackwall hitch. This is really no knot at all, but is useful for



Fig. 7.

Fig. 8.

hanging a weight from a hook. It will be seen from Fig. 9, where it is shown, that the heavier the weight, the tighter the end of the rope is jammed against the hook.



Fig. 9.

In fastening the end of two ropes for hauling, the simplest method is to use the *Common Bend* (C. C. T.).

Splicing. When two ropes are fastened together, end to end, without a knot, they are said to be spliced. Ropes must be spliced instead of knotted when they are to run through a pulley over anything on which the knot might catch. The appearance of a nicely spliced rope is shown in Fig. 10. To make



Fig. 10.

a "short splice," untwist the strands at the ends which are to be joined, and bring the ropes together so that the strands of one alternate with those of the other, as in Fig. 11.

The strands must be interweaved tightly, but they are shown loose in the figure to make it plainer. Then take any strand, for instance that marked *a*, pass it over *f*, and under *e*, which is lifted up for the purpose



Fig. 11.

with a tapering piece of wood or iron, called a marling-spike. Each strand is treated in the same way, then each is shaved down to about half its thickness, and the intertwining is repeated.

An "eye splice" is made by making a bight and splicing the end into the standing part.

For a "long splice" more of the ropes must be untwisted than for a short splice. After the strands have been laid alternately as before, untwist one strand, as *a*, still further, for several turns, and in the vacant

place thus left twist the opposite strand *f*.

At the place where they join, cut off all of each but a few inches, shave both down about one fourth, and tie them with an overhand knot.

Shave the ends down

another fourth, pass each over the other and under the two next strands, cutting off the ends as they appear. One of A's strands is then worked into B in like manner, and the third pair of strands is shaved and knotted in the same way at the original junction. This splice, if neatly made, does not increase the

thickness of the rope appreciably.

Parcelling is covering rope with strips of tarred canvas to protect it. When a rope is wound tightly with spun yarn, it is said to be "served." Rope's ends are served to keep them from ravelling, and splices are often both parcelled and served. When the channels between the strands of a rope are filled, it is said to be "wormed." Parcelling is also kept down by a kind of chain stitch called "marling."

In Fig. 12 the rope is "wormed" at *a* and "served" at *b*, and "marling" is shown at *c*.



Sailing-Cars. On some western railways cars propelled by the wind are often used instead of hand-cars to transport laborers and their tools. The car, which is about the size of an ordinary hand-car, is fitted with one or two masts. In one car the mainmast is eleven feet high, and both masts together carry about eighty square feet of canvas.

It is said that these cars have sailed at the rate of forty miles per hour directly before the wind. As they are confined to the rails, and therefore cannot tack, they cannot beat to windward, but it is said that they can sail very close to the wind.

An ancient sailing-car, which probably never existed except on paper, is shown in the last picture, taken from an old book.

For the history of Sailing, see YACHTING.

SALIC LAW, a SOLITAIRE game of CARDS, played with two packs. A King is selected from the packs before playing begins, and laid, face upward, on the table. Cards that cannot be used, as described below, are placed on this King until another one appears, when it is laid

beside the first, forming the base for another pile of useless cards, till its place is taken by a third, and so on. In a row just beneath these piles the Queens are placed, as they



Ancient Sail-car.

appear, and below these the Aces. On the latter are placed, in order of rank, the Twos, Threes, and so on, up to the Knaves, not following suit. The top card of any of the piles above the Kings can be used at any time. When the pack is exhausted, the top card of any pile can be placed on any uncovered King, freeing the card beneath it. The player is allowed to draw one card from the interior of one of the piles, and may look at any of the piles to see how they are arranged. If the player is successful, all the cards of the two packs will be arranged on the table in three rows of piles at the end of the game, a face card at the top of each pile.

The Salic law is a law that forbids women to come to the throne in some monarchies of Europe, and this game is so called because the Queens take no part in it.

SALT, Experiments with. Make a strong brine by shaking salt and water together in a bottle, until the water will dissolve no more. Color the brine with any ink that will mix with water. Make a pile of salt on a plate, and pour the colored brine gradually into the plate. It will rise in the pile of salt by capillary attraction (See SMALL TUBES) till the whole pile is colored. The experiment will not succeed with water, because it will dissolve the salt in the pile; but the brine has so much salt in it already that it cannot take up any more.

2. Fill a glass funnel with salt, packing it in tightly; invert it on a plate, and fit over the narrow end the mouth of an empty toy balloon, which has been kept very full of air a long time so that it will inflate with little force. Pour gradually into the plate some colored brine, prepared as before. It will mount higher and higher in the funnel, driving before it the air, which will inflate the toy balloon. The experiment will not succeed unless the salt is packed tight and unless the balloon has been well stretched, so as to inflate easily.

SANCHO PEDRO. See ALL FOURS.

SAND, Experiments with. 1. Fill a toy rubber balloon, or any kind of rubber bag, with clean, dry sand and shake it down thoroughly. Fasten in the neck a piece of glass tubing which is allowed to dip beneath the surface of a glass of water. Squeeze the sand. It might be expected that it would be pressed closer together, driving out air into the water, but this cannot be done by the hardest pressure. On the contrary, the bulk is actually increased by squeezing, as is shown by some of the water rising into the tube. The reason is that the grains of sand are closely packed and fitted together so that when they are disarranged by squeezing they occupy more space.

2. Shake down the sand as before, pour in water till the bag is quite full, and tie up the neck of the bag. The bag will now be found to be quite hard and rigid, though it is full of sand and water. The reason is that the sand cannot be squeezed without altering its position and increasing the space between the grains, but as the bag is closed and nothing can enter to fill the extra space, the bag will not yield to pressure at all.

The property of sand shown in these experiments is shared by shot, marbles, and almost any small objects. It was discovered in 1886 by Prof. Reynolds of England, who called it "Dilatancy."

SCALES. The different kinds of scales are told about in C. C. T. A pair of scales which will weigh pretty well up to ten pounds or so can be made thus. Take a stout, even stick, about three feet long, and bore a hole about an inch from each end, and a third in the middle, exactly half way between them. Take two shallow tin pans six or eight inches in diameter, and make three holes with an awl at equal distances around the edge of each. Tie in each hole the end of a piece of string about sixteen inches long, and unite the three strings at their other ends, so that the pan will hang horizontal. Tie each pan to the stick by means of the end holes, so that they hang at the same distance. Hold the scales by a loop of string passing through the middle hole. If properly made, the pans should balance, the stick being horizontal. If they do not, then either the pans do not weigh the same, or the third hole is not exactly in the middle. Put sand in one pan till it balances, and then untie the pans from the stick and exchange them. If they do not balance, this proves that the hole is not in the middle, and a new stick must be prepared. If they do balance, the scales are now all

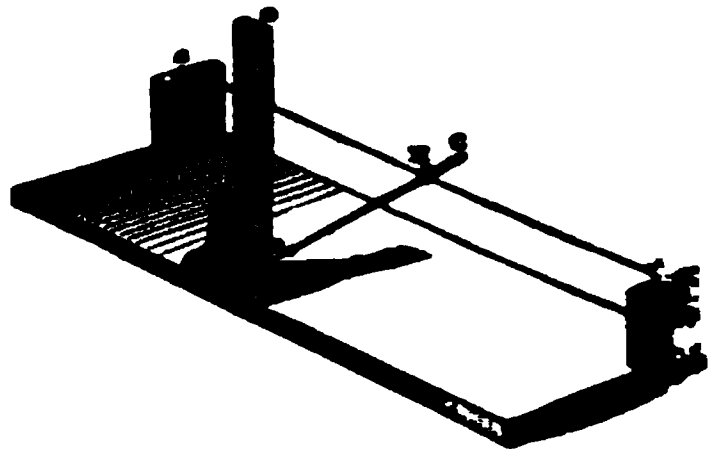
right, but the sand must always be kept in the pan in which it was put. Even if the scales balance perfectly at first, it is just as well to change the pans. To make weights, go first to a druggist and ask him to weigh out some sand in a glass bottle, so that bottle, sand, and cork shall weigh just, quarter of a pound together. Place this in one scale of the balance, and pour sand into the other till there is an exact balance. Then put the bottle into the same scale with the sand, and into the other an empty bottle, its cork lying beside it. Pour sand into this bottle till it balances all in the other scale, when it will weigh, of course, half a pound. Cork it and label it, and keep it for the half pound weight. In this way, by using the weights already obtained to weigh new ones, as many as desired may be made. These scales will do very nicely for rough weighings.

Steelyards. To make steelyards, take a stick about three feet long and bore two holes, one about an inch from one end, and the second about an inch from the first. From the end hole hang a scale-pan, as shown above, and in the other fasten a loop to hold the steelyard by. Fill a bottle with sand till it weighs about half a pound—exactness does not matter. Suspend it by the neck to a short loop and slip the loop over the long end of the stick. Put a pound weight on the scale, and slide the bottle along till it just balances. Make a notch at this place. Put two pounds in the scale and slide the bottle along till it balances again, making another notch and marking it "2" with a pencil. So go on till you have a notch for every pound. Notches for the half pounds can be cut exactly half way between, which will not be far out of the way. To weigh six pounds, for instance, hang the bottle in the six-pound notch, and then put in the pan whatever you wish to weigh, till it balances.

Spring Balance. Take a piece of

elastic cord which can be stretched to a length of six or eight feet. Fasten one end to a nail near the ceiling, and at the other end tie a wire hook, to which are to be hung the articles weighed. Tie a bit of colored sewing-silk around the elastic cord just above the hook. Now fasten successively to the hook the different weights obtained by means of the scales described above, and make a pencil mark on the wall at the spot opposite which the silk stops, each time. Then anything which stretches the elastic just as much as the half pound weight, for instance, must weigh exactly half a pound. To weigh many pounds, a large and strong elastic must be used.

Torsion Balance, a weighing machine in which the object weight is balanced by the "torsion" of a wire, that is, its effort to untwist. A simple one can be made as follows:



Torsion Balance.

Fasten an iron wire, A B, first across a wooden standard like that shown in the picture. At its middle, H, secure one end of a strip of strong light wood, C and D. This may be done by filing flat surfaces on opposite sides of the wire, splitting the end of the wood, fitting the cleaves over the wire, and then winding it both sides of the wire with strong waxed thread. The strip should project horizontally, or point slightly upward, when at rest. About an inch from the end tack to the strip a light paper box, D, to hold the object to be weighed. At the end of the strip, which must be pointed,

upright wooden post, F G, is fixed for the scale to be marked on. A pencil mark is made on this, opposite the point of the lever, and then an object whose weight is known is put into the box. Suppose this to weigh an ounce. Mark the spot to which the lever falls, and then divide the space between the two marks into as many equal parts as you wish. If it be divided into ten parts, each will represent a tenth of an ounce. The size of the balance may be large or small, as desired. A short, strong wire will weigh large quantities—a long, thin one, very small ones. By using a fine platinum wire, and a wisp of straw for a lever, the hundred-thousandth part of an ounce may easily be weighed.

SCANDAL, a game played by any number of persons, who sit in a row in a circle. One of them whispers a story in the ear of his neighbor, and in turn, whispers it to the next, and so on till it reaches the last, who repeats it aloud. The first player repeats it as he told it at the beginning, and it will generally be found that the two stories are quite different. Instead of a story, a single sentence spoken very fast may be used. This game is named Scandal, because it shows how stories are often changed in passing from mouth to

This game is called

Gossip

reads them, one by one, aloud. As they are read the person about, whom the opinion is written guesses who its author is, and if the guess is correct the author pays a forfeit. Sometimes the players are required to write their opinions in verse, and sometimes, when there are few players, each writes an opinion of every other, instead of only one. When there are few players, the opinions may be whispered by each one to the Secretary, instead of writing them down. That no one may venture to say anything disagreeably personal, the Secretary should announce the author of each opinion at the close of the game.

Another way of playing is for each one to write on his slip an assumed name, instead of his real one. After the second distribution of slips, each writes a description of the person he supposes to have adopted the name on the slip. The Secretary reads these one by one, announcing the owner of the name at the end of each.

SECRET WRITING. The simplest and commonest kind of secret writing is that in which every letter of the alphabet is represented by some letter, figure, or mark, and always by the same one. The correspondents must each have a key

to be unknown. By looking over it carefully, the first and last letters of the third word from the end are seen to be the same as the first and the last two of the last word. Now as "hm5" is the only word of three letters in the sentence, it is probably "the." The last word then reads t.ee (putting dots for unguessed letters), which must be "tree." The word between "the" and "tree" very likely is the name of the tree. It ends with "e," and its second and third letters are the same. By trying the names of several kinds of trees, it is found that "apple" is the only one that answers. Now the letters standing alone, "z" and "r," are probably "I" and "a;" and as the latter is the first letter in "apple," the former must be "I." The word of two letters before "the" must therefore be either "it," "is," or "in," and the word before it is te.t, se.t, or ne.t. The first would have to be "tent" or "test," neither of which makes sense. The second is either "seat" or "sent," and the last can only be "nest." If it were "seat," the last three letters of the previous

then it is possible to guess it by patient work, remembering that the letters occurring oftenest are the vowels.

Another way of varying this kind of writing is to agree on ten or twelve signs which shall mean nothing at all, and which may be put in anywhere. Thus, if c, e, f, j, and l were such, the first three words of the sentence given above might stand Cjzowe7dlbfjne. The reader who has the key simply strikes out the signs which mean nothing, or disregards them in reading.

Another kind of secret writing is that in which every letter is represented by a single character, but not always by the same one. There are many ways of effecting this. For instance, under the letters of the alphabet may be written three or more different rows of characters. The first time a letter occurs, it is represented by the corresponding character in the first row, the second time by the one in the second row, the third time by that in the third row, the fourth time by the one in the first

A word is then agreed on by the correspondents as "key-word." Let us suppose it to be "Cyclopaedia." When a sentence is to be written, the key-word is first written under it. Thus:

I hope to see you on Monday next.
c y c l o p a e d i a c y c l o p a e d i a c y c .

To find the letter representing any given letter in the sentence, begin at that letter on the left of the alphabet square, and follow a horizontal line till you come immediately below the corresponding letter of the key-word. Thus, the first letter in the sentence is "I," the corresponding one of the key-word is "c." The letter in the same line with "I," which has "c" at the top of its column, is found to be "k." In the same way, beginning at "h" and running along the line until we are under "y," we find "f" for the second letter. The sentence reads thus when completed:

K f q a s i o w h m y q s q y a d n h d g n g v v .

To translate it, the one who receives it writes the key-word above it, and then, beginning at the left of the square with each key-word letter, follows the line till he comes to the letter just under it in the cypher. The letter at the top of the column will be the one he wants. Evidently this kind of secret writing cannot be translated without the key-word; but when that is once obtained, the task is easy. If the sentence is separated into words, some of them may often be guessed, after several trials, and the key-word found out by the alphabet square. To avoid this, the correspondents may run their words together, or use a long sentence as a key-word—a proverb or quotation, for instance. Many other ways of making different characters represent the same letter at different times may be devised with a little ingenuity.

Another kind of secret writing is that in which each word is represented by a separate character, or

by another word. If each word is to have its own character, as in the Chinese language, then each correspondent must have for his key a list of the words likely to be used, and the character belonging to each. This is awkward, and is seldom done. An easier way is to select some dictionary or vocabulary in which words are arranged alphabetically, and agree that each word shall be represented by the word in the same position a certain number of pages ahead. This method was used in the famous political "cypher dispatches" in 1876. For instance, suppose Webster's Dictionary (edition of 1890) be selected, and it be agreed that every word shall be represented by the one three pages farther on. Then "day," which is the second word on page 336, is represented by "debit," the second word on page 339, and so on. Another way is to select a book, and refer to a word by giving its page and number. Thus, 153-87 might mean the 87th word on the 153d page. Of course pages should be chosen in which the desired word comes near the top, to save counting. It may be agreed that when a line is drawn beneath the number, the counting is to be done from the bottom.

But the most secret kind of writing is that in which the very fact that there is any secret message at all is concealed. Any one who sees a letter written in one of the ways described above, knows at once that there is something to be concealed, and the object is sometimes to hide even that fact. This is usually done by writing what appears to be an ordinary letter in such a way that certain words, taken in order, form the secret message. For instance, it may be agreed that every seventh word in the letter shall make up the message. Suppose it is wished to send the message, "Our plan has failed." Some such letter as the following may be written. "Dear

Fred: Will you come to our house on Tuesday, the 30th? Our plan is to have a little picnic. Has John been in town lately? He failed to put in an appearance yesterday." The seventh words of this note, as will be seen by counting, make up the desired message. Another way to mark the words forming the message, is for each of the correspondents to have a sheet of blank paper with holes cut in various places, the holes in the two sheets matching exactly. The writer places his sheet over the paper on which he wishes to write, and writes the words of his message through the holes. Then he removes the sheet and fills up the spaces with other words, so as to make the whole read like an ordinary letter. The one who receives it places his sheet of paper over it, and reads the message at once through the holes. Both these methods require some skill. An easier way is to mark the words of the message by writing them in a slightly different hand, or by placing a minute dot, or other sign, under each; but this, unless done very skilfully, is apt to betray the secret.

Still another kind of secret writing is that which is done, wholly or in part, with "sympathetic ink." This is some fluid which is invisible when first put on the paper, but is brought out by heating or applying some chemical. The whole letter may be written in the ink, or it may be used simply to mark words in what appears to be an ordinary letter.

If the letter be written with water in which chloride of cobalt has been dissolved, the writing will be invisible till it is heated. If it be written with a weak solution of boiled starch, it will appear blue when brushed over with iodine. Words written with copperas dissolved in water appear brilliant blue when the paper is dipped in a solution of prussiate of potash.

SEEGA, a game played by two

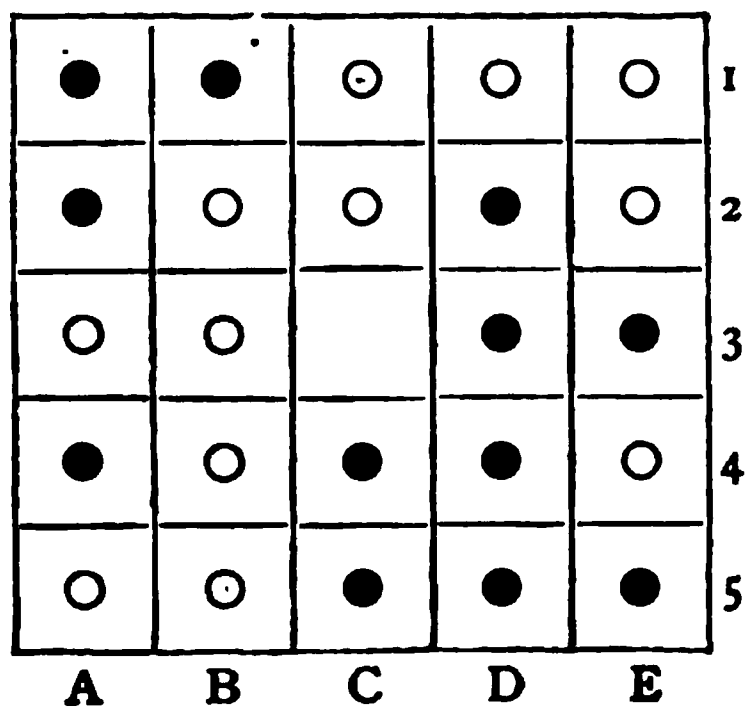
persons on a checker-board of twenty-five squares (five on each side), with twenty-four men of two colors, generally black and white. An ordinary checker-board and men will do if the board be reduced in size by strips of paper. It is played alternately and consists of two parts—placing the men and moving them. The player having first move places two of his men wherever on the board he chooses, either on adjoining or far separated squares. The second player lays down two men in like manner, and this is continued alternately until all the men have been placed on the board, care being taken by both players to leave the centre square unoccupied.

When the men are thus placed, the first player moves one of his men backwards, forwards, or sideways, but never diagonally. Evidently the first move must be into the middle or vacant square. Each player tries to move so as to catch one of his adversary's men between two of his own in horizontal or in perpendicular lines, not in a diagonal. A man so caught is removed from the board. If, however, in moving, one player moves one of his own men between two of his opponents, he suffers no loss; a capture must be forced by the opponent. If the player who has captured one of his adversary's men can put a second or a third in danger by moving his own again, he has the right to do so; but this move must be made before he has laid down the captured man.

If one player becomes blocked and unable to move, the other either continues moving until he opens a way for the first, or he has to remove one of his own men from the board, selecting one that permits the first player to move. The game is continued until one or the other player has lost all but one of his men.

The method of placing the men

and the various moves will be easily learned from the following illustrative game, the diagram showing the men as placed before moving :



Setting the Men.

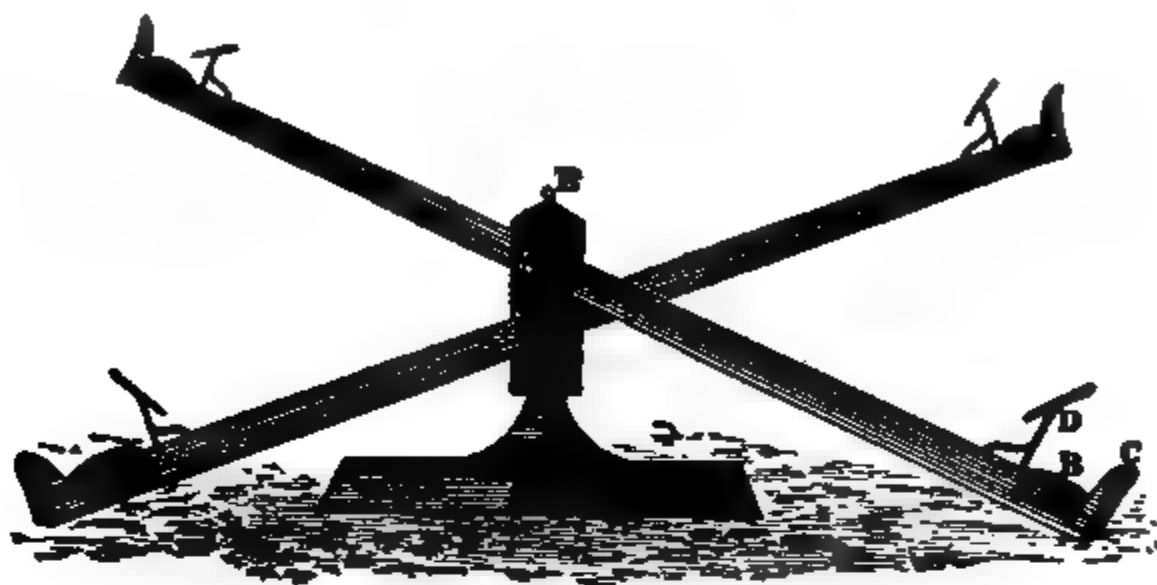
White (Mr. W.).		Black (Dr. B.).	
1	1 C and 2 C	3 D and 3 E	
2	3 A and 3 B	4 C and 5 C	
3	2 B and 4 B	2 D and 4 D	
4	2 E and 4 E	1 B and 5 D	
5	1 D and 5 B	2 A and 4 A	
6	5 A and 1 E	1 A and 5 E	
Moves.			
7	2 C to 3 C	2 D to 2 C × 2 B and 3 C	
8	3 B to 3 C × 2 C	2 A to 2 B	
9	3 A to 2 A	2 B to 3 B × 3 E and to 3 A × 2 A	
10	1 C to 2 C	1 B to 1 C	
11	2 C to 2 B	1 A to 1 B	
12	2 B to 2 C	3 D to 3 C × 2 C	
13	2 E to 2 D	3 C to 3 D	
14	1 E to 2 E × 3 E	3 D to 3 E × 4 E	
		4 C to 3 C × 2 C and 3 C to 4 C × 4 B	
15	2 D to 2 C		
16	1 D to 1 E	1 C to 1 D	
17	5 B to 4 B	5 C to 5 B	
18	4 B to 3 B	4 C to 3 C × 3 B	
19	2 E to 2 D	4 D to 3 D × 2 D	
20	1 E to 2 E	1 D to 1 E × 2 E	

And Black wins.

History. Seegà is an Egyptian game, probably of great antiquity. It is played much by the peasantry in Egypt and by the Bedouins in the desert, generally with black and white pebbles in holes made in the ground. The common game is with twenty-five holes or squares, like that described, but it is sometimes played with forty-nine squares and forty-eight men, or with eighty-one squares and eighty men, though the latter makes it of tedious length. The holes or squares in the seegà or board are called by the Egyptians *oyoon* (eyes), and the men *kelb* (dogs). Lane, in his "Modern Egyptians" (3d ed., 1842), says: "Several Seegas have been cut upon the stones on the summit of the great pyramid, by Arabs who have served as guides to travellers." Dr. H. Carrington Bolton, of New York, to whom we are indebted for an account of the game, saw it played by Bedouins in the desert of Mt. Sinai with pebbles in the sand. The game given herewith was actually played by him with a friend on a Peninsula and Oriental steamer.

SEE-SAW, a board balanced at its middle over a block of wood or a fence rail. A person sits on each end, and the two, by pushing with their feet against the ground, make the ends move up and down alternately. The board should be as long as possible without bending, and the point on which it is balanced should be so high that the feet of the person on one end are well off the ground when those of the one on the other end are touching it. Sometimes a third person, called the "Candlestick," stands in the middle and aids the motion first with one foot and then with the other.

When those who ride on the see-saw are equal in weight, the plank must be balanced exactly in the middle, but otherwise it must rest



Ancient See-Saw.

on a pivot nearer the heavier person. The light rider, therefore, has a longer ride, and moves faster than the other.

See-sawing is a very old amusement. An ancient French see-saw, called *Basculé Double* (Double Swing-down) is shown on the following page. The boards swing on pivots A A in a standard E, and move at right angles to each other. B is a cushion, C is a back for the rider to lean against, and D a handle for him to hold on by.

SENSITIVE FLAMES, Experiments with. Nail a block of wood, A, to a block, D, as shown in the illustration, and fasten at the top of A a wire, B, with a ring five inches in diameter at one end. Lay a piece of wire gauze, C, over the ring. Make a glass jet, E (see CHEMICAL EXPERIMENTS), of tubing about quarter of an inch in outside diameter, the diameter at the opening being about three quarters of this. Bend it at right angles, and stick it with wax on the block E with its tip about two inches under the gauze. Connect the jet with a gas burner by rubber tubing, and light the gas above the gauze, where it should burn in a thin conical flame about four inches long. This flame is so sensitive to noises, that at the sound of

a hiss, a whistle, a jingling, or the clapping of the hands, it shrinks at once to a small blue flame.

Sensitive Flame.

2. Cover the flame with a tube, T, from seven inches to two feet long, and from three-quarters of an inch to one and a half inches in diameter. The best size is about one foot long by one and one-fourth inches in diameter. The tube rests lightly on the gauze. The flame is now still more sensitive to high, sharp sounds.

If the gauze and tube be raised slowly, the flame shortens and finally begins to "sing" loudly. The gauze should now be lowered till the singing just ceases, when the flame becomes very sensitive, beginning to sing at the slightest sharp sound, but ceasing when the sound stops. The responses are so quick that when, for instance, the word "sensitive" is pronounced, the flame sings twice, once for each S.

SETTO. See SYNTHESIS.

SEVENS AND EIGHTS, or DOMINO WHIST, a game of CARDS played by any number of persons with a full pack. The scoring is done with counters, any number of which are distributed equally among the players at the beginning of the game. The whole pack of cards is dealt, one at a time, and then each plays in turn, beginning with the eldest hand. The object of the players is to place the Sevens and Eights in two rows on the table, and then all the other cards in order, by suits. Thus, opposite the Sevens of Hearts must be placed in order the Six, Five, Four, Three, Two, and Ace of Hearts; and opposite the Eight, the Nine, Ten, Knave, Queen, and King of the same suit. No card can be put down out of its regular order except Sevens and Eights, which can be played at any time. Only one card is played at a time. Each one must play if he can, and if he cannot, he must place a counter in the middle of the table to form part of the Pool. He who first gets rid of his cards takes the Pool and in addition each of the other players gives the winner a counter for every card left in his hand.

Of course the first card played will be a Seven or an Eight, and the opportunity for playing will generally be greater as the game goes on. A good player often holds back a Seven or Eight as long as possible, thus preventing others from playing, increasing the pool, and enabling him to get rid of his

cards before them. If there is not room enough on the table for the whole pack to be spread out, the other cards may be piled on the Sevens and Eights.

The game is sometimes called Domino Whist because the cards are matched on the table somewhat as in DOMINOES, but it does not at all resemble WHIST.

SEVEN UP. See ALL FOURS.

SHADOW PICTURES, shadows thrown on a wall or screen so as to form pictures in various ways. The most common shadow pictures are made by holding the two hands so that their shadows will resemble some animal or bird. To make such pictures well requires considerable skill. The position of the hands in making several of them is shown in the full-page illustrations.

Another kind of shadow pictures is made by cutting out figures from sheets of paper and throwing their shadows on a sheet hung in a doorway, the spectators sitting on the opposite side. The best size for the pictures is about three feet long by two feet high. They may be made by cutting out parts of any large woodcut like those in the illustrated papers, but care must be taken that the figures selected are in profile, so that their shadows will look well. If the exhibitor has any skill at all in drawing, a better way is to make pictures especially for the purpose. They may be drawn on an ordinary newspaper, and no matter how crude they are, they usually look well in shadow. All the pictures are made on paper of the same size, and then the sheet in the doorway is covered with papers pinned to it, all but a space in the middle just large enough to show the pictures, which will then appear in brilliant white on a dark background. There should be two exhibitors, each of whom holds a corner of the picture so that it hangs close against the sheet. If there is

1

1

3

4

5

6

7

8

only one exhibitor, the pictures must be fastened to sticks, one end of which he holds; otherwise he would be obliged to stand between the lamp and the picture. The pictures must be so drawn that no part that is to be cut out completely surrounds a dark part, otherwise the latter will have no support. If necessary, however, such a part may be fastened by pasting very narrow strips of paper from it to other parts of the picture. The shadows of the strips will not show at a

little distance. After practice, these pictures can be made very rapidly, and as a lamp and a sheet are the only apparatus necessary to show them, an exhibition can be prepared at an hour's notice. Some of the figures may be cut out of separate slips of paper, and arranged so that they may be moved about, which will add to the amusement.

Shadow pictures may also be cut out of paper so as to show as dark figures on a white ground, like silhouettes. Sometimes they are so



Shadow Pictures Cut from Papers.

ingeniously made that it is difficult to tell what they represent till the shadow is thrown on the wall. In the illustration, Fig. 1 shows how the paper is cut. Fig. 2 is a sharp shadow thrown by it, and Fig. 3 a blurred shadow. The last gives the proper effect.

Portraits may be made for exhibition by throwing the sitter's shadow in profile on a sheet of paper pinned against the wall. The outline of the shadow is traced with a pencil and then cut with scissors. The portrait will be light on a dark ground or dark on a light ground, according as the outside or inside of the paper is used to cast the shadow. Such portraits may be preserved by pasting them on black paper, and they may then be framed or kept in a portfolio. Care should be taken in tracing the outline that the sitter remains perfectly still, and in

cutting it out that the scissors fol-

low the line exactly. A very small deviation alters the expression.

Magic Dance. A second curtain, called the magic curtain, is stretched about two feet behind the white sheet on which the figures are to be thrown. This magic curtain must be perfectly opaque, being made of thick black cloth, or of canvas painted black. In it are several

Magic Dance.

holes which vary in size according to the size of the figures to be exhibited, and are arranged as the figures are to be grouped. The latter may be cut out of paper which is pinned over the holes, or they may be painted in colors on glass like a magic lantern slide. If now the exhibitor stand behind the magic curtain with a lighted taper, such as are used for Christmas trees, an image of each figure will be

thrown on the screen in front. If he hold a taper in each hand, two images of each figure will appear, and if he move the tapers from side to side, or in curves, the figures will appear to move about in like manner. By multiplying the number of tapers, the figures can be made to perform the most complicated kind of dance. The other tapers should be held by persons whose movements are controlled by the exhibitor by means of signals previously agreed on. One may hold several tapers by fixing them on cross-pieces nailed on a stick, but the images cast by those tapers will, of course, always preserve the same distance from each other. The effect is heightened if any of the figures can be made to disappear at will, as will be the case if the holes can be stopped up. The best plan is to stretch the magic curtain in a doorway and nail across it thin battens, one just above each hole. Pasteboard flaps are then sewed to the curtain under each hole, and when shut over the holes are fastened to the batten by a wooden button; or, cloth flaps may simply be pinned over the holes by an assistant. The following is an example of what may be done with this arrangement. Suppose that there are four holes at the corners of a square, and that the figures in them represent old women in various attitudes. It is well to have some of the figures so drawn that they may be made to move either way without seeming to go backward. The holes are all stopped at first, so that the screen is dark. One of the flaps is removed, a taper is lighted, and an old witch starts out on the curtain. By moving the taper she is made to run back and forth, and leap into the air. The operator must remember that the figure always moves in the opposite direction from the taper, so that to make it leap up he must move the taper down. A second taper is now

lighted and another similar figure appears. The two run forward and backward, and leap over and under each other, finally running together and melting into one. Another flap is let down and a different old woman appears. Thus by lighting and extinguishing the tapers and stopping and unstopping the holes, one by one, the figures can be made to appear, disappear, and dance about in the greatest confusion. In order that one figure may not interfere with another, the operator should practise his movements first, while some one on the opposite side of the screen tells him of the effect. This is necessary, since he cannot himself see the screen on which the pictures are thrown.

SHADOW PLAYS, plays, in which not the actors, but their shadows, are seen by the audience. They may be spoken plays or pantomime. In any case, a large sheet is hung in a doorway, on one side of which the audience sit, while the actors perform on the other, their shadows being cast on the sheet by a single lamp, which should be as bright as possible. With more than one lamp, double or triple shadows would be cast. Some skill is required always so to act that the shadows will show the action distinctly. Profiles should be shown on the sheet as much as possible. Where the shadow-play is given in a hall, the shadows are thrown on a curtain of white muslin, which must be made with tightly-sewed seams. The shadows can be made more distinct by wetting the sheet or curtain just before the performance, which may be done with a sponge. Some of the most striking effects in a shadow-play are produced by a performer's stepping over or under the lamp. In the first case he appears to the spectators to jump up through the ceiling, and in the second to sink through the floor. In those parts of the play where any one is to step over the lamp, it should be

placed on the floor about six feet from the curtain. Directly behind it should be placed a wooden box a little higher than the lamp, on which the actor can step. This box serves also to protect the lamp from being overturned. When a player is to go under the lamp, it is slowly raised by an attendant, who takes good care to stand so that his shadow will not fall on the screen. At other times, the lamp should stand on a low table about ten feet from the curtain. Some person should be given special charge of it, and should rehearse the pantomime with the performers, so that he will know exactly when to move the lamp. The position of the light must be changed very gradually in all cases.

The performers should stand as close as possible to the curtain, as the shadows will then be nearly of the natural size, and moving the lamp has less effect on them. The arms must be held at equal distances from the light, otherwise one will appear larger than the other. Stepping over the lamp should be done quickly and with a single movement.

All small "properties" are made of pasteboard, and when signs are needed they are cut out so that the letters appear in white on a dark ground. Sawdust or oatmeal is the best representative of water or blood. As any two objects in line with the lamp throw shadows in the same place, many comical effects may be produced. For instance,

Shadow Plays.—Fig. 1.

the shadow of a pasteboard house may be thrown on the curtain, and a man rising slowly behind it may appear to come out of the chimney (Fig. 1). Or, in the same way, a man may be shown leaping into a crocodile's mouth, as in Fig. 2. As many of these ridiculous effects as

possible should be introduced in the play. The chief advantage of a shadow pantomime is that these effects are very easily arranged, whereas in an ordinary pantomime they require the aid of apparatus which is difficult to make and often expensive.

Shadow Plays.—Fig. 2.

SHEEPFOLD, THE, a game played by any number of persons, two of whom are chosen as "Wolf" and "Lamb," while the others join hands in a circle, to form the "Sheepfold," inside of which is the Lamb. The Wolf endeavors to break through the joined hands so as to reach the Lamb, but if he does so, the Sheepfold opens on the opposite side, letting the Lamb out, and closing in time to imprison the Wolf. The latter now tries, in the same manner, to get out, and if he does so the Lamb is admitted again. If the Wolf succeeds in catching the Lamb, the two players between whom he broke through the sheepfold, last become Wolf and Lamb in their turn.

SHOUTING PROVERBS. See PROVERBS.

SHOEMAKER'S WAX, Experiment with. Place a cake of shoemaker's wax on three or four small corks. On the cake put several leaden bullets. Leave the wax alone, and in the course of several

weeks the corks will work through the wax to the top, while the bullets will go to the bottom. The reason is that shoemaker's wax, although very tough, has some of the qualities of a liquid. Hence the light corks rise to the top and the heavy bullets fall to the bottom, just as they would in water, if they are only given time enough.

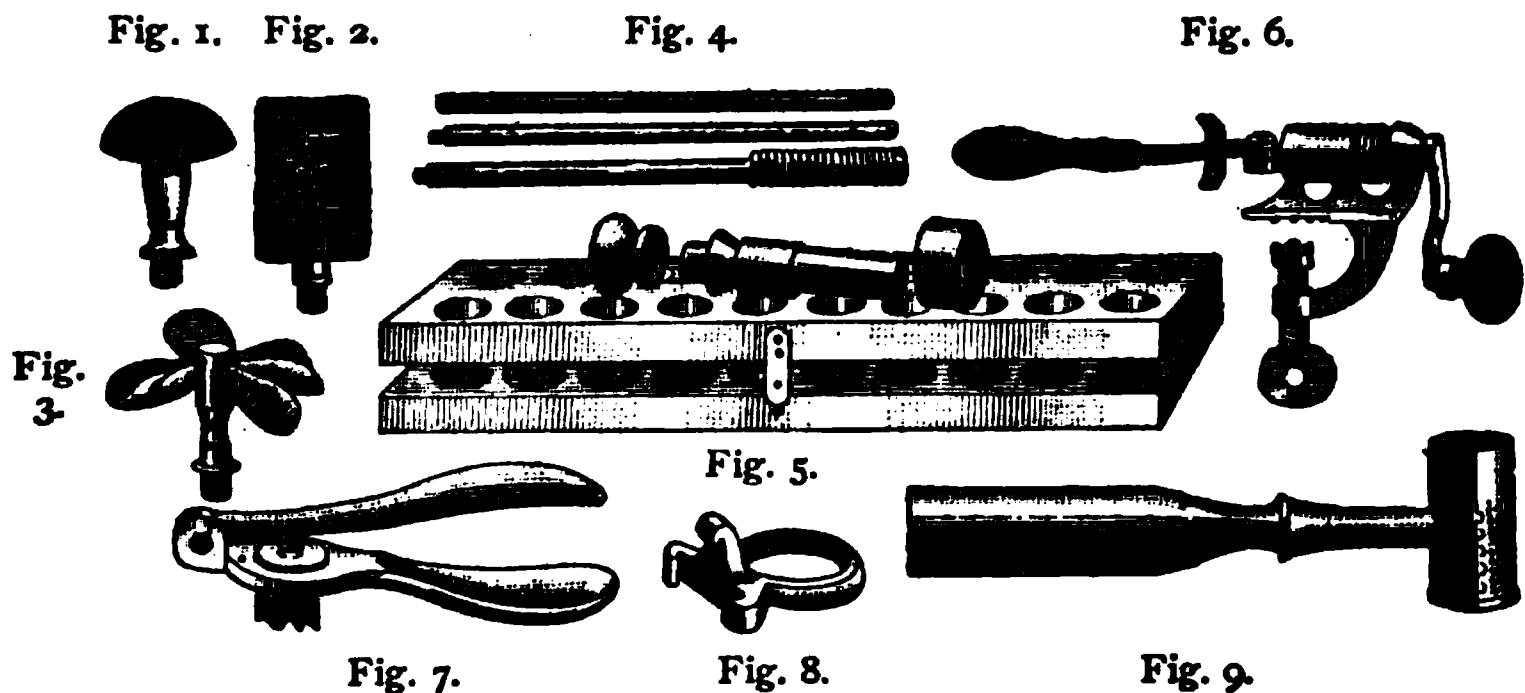
SHOOTING. The firearms generally used for sport are the shotgun, the rifle, and the pistol. For the general description and history of guns, see C. C. T. under Rifle. The rifle and pistol are used for target shooting. In the field the rifle is best adapted to furred game—squirrels, deer, etc.; and the shotgun to bird shooting. Shotguns are single-barrelled or double-barrelled. The single is cheaper and lighter; the double has the advantage of giving a quick second shot. In a muzzle-loader the charge is inserted in the barrel at the muzzle and pushed in with a ramrod; in a breech-loader it is inserted into

the chamber at the breech, the gun being opened or "broken" for the purpose. Muzzle-loaders are now almost entirely superseded by modern breech-loaders; the former cost less, but the latter are more convenient to handle, more safely and more rapidly loaded, and decidedly more effective in their work. With a breech-loading shotgun the sportsman need never turn the muzzle of his gun toward himself. The charge in a gun consists of powder, shot, and wads, which in a breech-loader are contained in a metal or paper case called a shell, having in its base a cap or primer of percussion powder which explodes

when struck by the hammer of the gun.

The "action" of guns, both that by which they are opened or "broken" to put in the cartridges, and that by which they are fired, usually differs with the maker. Most guns must be cocked, before shooting, that is, the hammer must be pulled back ready to fall on the cap; but hammerless guns are made which are cocked by opening the gun to insert the cartridge, and which cannot be set off accidentally by dropping them on the hammer, as the others can.

Cartridges already loaded may be obtained at gun-shops, or shells may



Reloading Tools.

Figs. 1-3. Swabbers. Fig. 4. Decapper. Fig. 5. Cartridge-holder. Fig. 6. Charger
Fig. 7. Recapper. Fig. 8. Cartridge-extractor. Fig. 9. Charge-measurer.

be bought and loaded at home. Metal shells may be reloaded as often as desired; but paper shells are commonly used only once. The tools for reloading are a decapper, for removing the old cap, a recapper for putting in a new one, a funnel for pouring in the powder and shot, a wad-seater, a block for holding the shell, and for paper shells a creaser or crimper by which the shell is creased, or its edge turned over, to hold the charge in place. Some of these are shown in the illustration. The new cap should be

inserted before loading; for if it explodes then no harm can be done. The powder is then poured in, then wads are inserted, then the shot, and then a lighter wad. Wads are bought ready-made. If the gun is a muzzle-loader, the charge, in the order described above, is put directly into the gun instead of into a cartridge. The quantity of powder and shot, and the size of shot used, varies with the object to be shot at. Loads for different kinds of game are given in the article on HUNTING. The ordinary charge for guns with number 10 bore is from

4 to $4\frac{1}{2}$ drams of coarse powder and $1\frac{1}{2}$ ounces of shot; for 12-bore, 3 to $3\frac{1}{2}$ drams of powder and $1\frac{1}{2}$ ounces of shot; for 14-bore, $2\frac{1}{2}$ to 3 drams of powder and $\frac{7}{8}$ to 1 ounce of shot; and for 16-bore, $2\frac{1}{2}$ to $2\frac{3}{4}$ drams of powder and $\frac{3}{4}$ to $\frac{7}{8}$ ounces of shot. The extreme load is 4 drams of powder in a 12-bore, and 5 drams in a 10-bore gun.

The sizes of shotguns are designated by numbers expressing the gauges or diameters of their bore, as 10-gauge, or 10-bore, 12-gauge, etc. The origin of these numbers was this: A ball, of which 10 weigh a pound, fits a 10-gauge; balls weighing 12 to the pound fit a 12-gauge, etc.; hence the higher the number of the gauge the smaller is its diameter. Bores range from 4 (large) to 20 (small); those in common use are 10's and 12's. Guns are cylinder-bored, that is with the bore of the same diameter from chamber to muzzle; or choke-bored, that is, having the bore "choked" or constricted at a point just back of the muzzle for the purpose of keeping the shot together in their flight through the air. The constriction is from $\frac{5}{1000}$ of an inch to $\frac{1}{1000}$ of an inch.

The relative merits of choke- and cylinder-bores are these: A choke-bore, delivering its shot in a more compact mass, will kill more surely at greater distance; but it requires more careful aim; it is specially adapted to wild-fowl shooting. A cylinder gun, because it spreads the shot over a wider circle, requires less careful aim, and is preferable where the game is shot at short range. Young sportsmen usually prefer a cylinder-bore. Many sportsmen prefer to have the right barrel of a double-barrelled gun cylinder-bored and the other choke-bored. The right barrel is used at close range, and the left at long range, because it scatters the shot so little. Choke-bored barrels were described as early as 1787 by a Frenchman

named De Marolles, but he did not approve of them and they have been adopted only recently. Jeremiah Smith, of Rhode Island, devised a successful mode of choke-boring in 1827, and was perhaps the first to do so, though the credit is given by some to other inventors. The merits of the system were first explained to the public in 1879 by Joseph W. Long, in his book on "Wild-Fowl Shooting." Mr. Long says that choke-boring doubles the closeness of the "pattern" on the target at 40 yards.

The shooting qualities of guns are determined by shooting at a target, usually a sheet of paper, placed at a distance of 40 yards from the muzzle of the gun. On the paper, before or after the gun is fired, is drawn a circle 30 inches in diameter. The marks made by the shot pellets which strike within this circle constitute the "pattern." If a large proportion of the entire charge strikes within the 30-inch space, the gun is said to "pattern closely;" and if the shot are evenly distributed, to "pattern evenly;" the pattern is also designated by the number of the pellets. The force with which the shot are projected is measured by their penetration through the leaves of a book or a pad of paper. A gun which gives good penetration is said to "shoot hard."

The stocks of guns vary in length, and crook, bend, or "drop," to fit different shooters. The length and bend should be such that when the gun is brought to the shoulder the rib or top of the barrels should be in line with the eye and a mark on the same level with the eye. A long-armed shooter will require a long gun-stock; a long-necked shooter a stock with much drop. In selecting a gun care should be taken to choose one that fits the shooter.

Safety. To avoid accidents with a shot-gun or rifle, the following rules should be observed:

1. The sportsman must always treat a gun as though it were loaded, even if he knows it to be unloaded.

2. He should never allow the muzzle to point toward himself or any other person.

3. He should never put his hand over the muzzle.

4. He should take out both cartridges before climbing a fence, getting into a wagon, or entering a house. If the gun is a muzzle-loader, the caps should be removed in like circumstances, though some people think it unwise to keep a loaded gun in the house uncapped, because some one, thinking it unloaded, might then put on a cap, snap it, and so discharge the gun. But if Rule 1 is closely observed, this will never be done.

Cleaning. Most people clean their guns after each day's use, but some think that they should never be cleaned. The best way to clean them is to wash thoroughly with very hot water and then oil lightly.

Trap Shooting. As shotguns are generally used to shoot birds when on the wing, the first acquirement of the beginner should be to aim quickly and correctly. To attain this practice should first be had on a mark at rest, and when, after repeated tests, the ability has been acquired to bring the gun to the shoulder with correct aim, the learner should practise hitting small objects thrown into the air, etc. The best practice of this kind is trap shooting. A simple trap may be made of an elastic strip of wood 4 feet long, 3 inches wide, and half an inch thick, one of whose ends is nailed to a heavy board, which is fastened to the ground by driving stakes through holes in it. The middle of the strip is supported at such a height that its other end can easily be bent down and fastened to the board by a notched trigger. The end of the strip that is thus secured has a small tin box-lid fastened on it,

and when the strip is released, by pulling a string tied to the trigger, anything placed in the box-lid, such as an apple or a potato, is thrown into the air, where it can be shot at. The traps sold by dealers in sporting

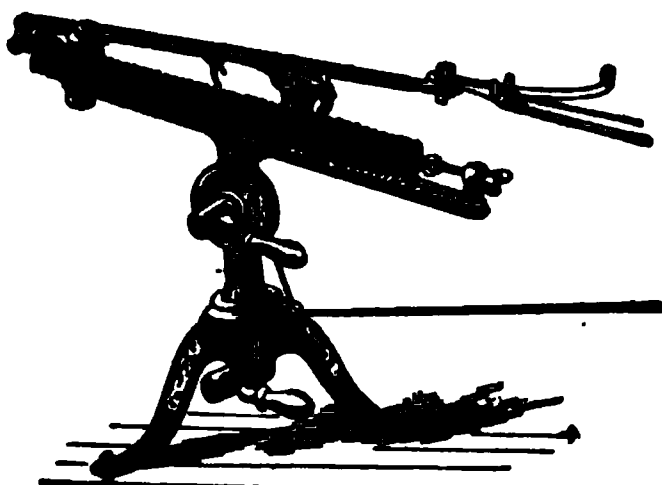


Fig. 10.—Trap.

goods (Fig. 10) are made with steel springs, and throw up artificial targets, generally called "pigeons," of which there are numerous patterns, in general shape like a saucer (Fig. 11). The clay pigeon is very thin and brittle, so that a single shot can break it. When thrown, these "pigeons" imitate very closely the apparent shape and flight of a bird,



Fig. 11.—Clay pigeon.

the rounded edge, which is upward, looking against the sky like the outline of the back and wings. Glass balls were formerly much used in trap-shooting, but have now gone out of fashion. The moving targets must be brittle, for it is hard to tell whether they are hit or not, unless the shot breaks them. For this reason also very small shot cannot be used, and the gun must not scatter its shot. The trap gives the object shot at great speed at first, so if the ball flies away from the shooter he must fire very quickly.

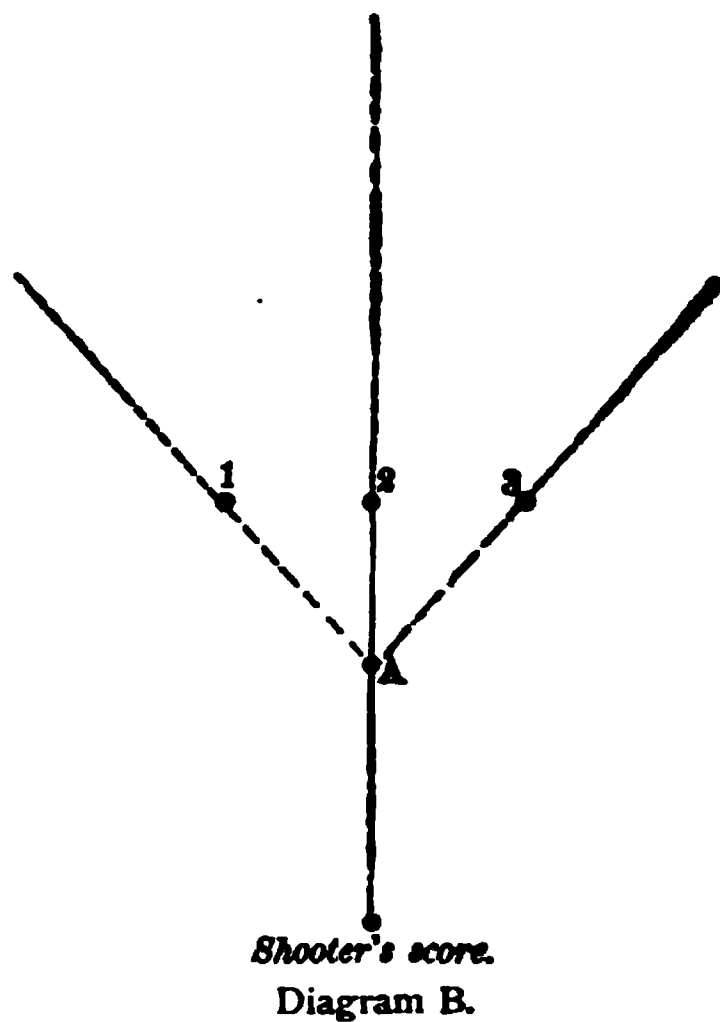
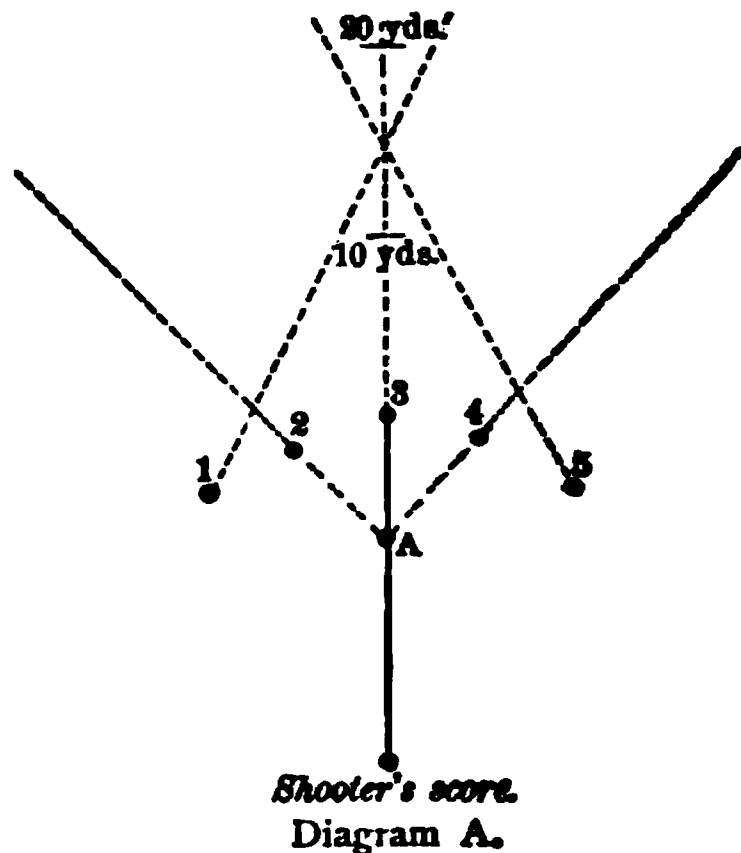
The shooter must stand so that his arms may be free to move swiftly. His weight rests equally on both

feet, the left being somewhat advanced, and the upper part of the body bent forward a little. The right hand holds the pistol-grip of the gun, the forefinger touching the trigger, and the barrel rests in the left hand, pointing slightly upward. At the word "Pull" the trap is sprung by an assistant, and at the same instant the right hand must be raised so that the gun comes to the level of the right eye, the breech resting in the hollow of the right shoulder. The rib between the barrels should be directly under the eye. While doing this, the shooter looks steadily at the point toward which he intends to fire, and when the gun is pointed toward it, he pulls the trigger. Long practice is required properly to bring the gun into position, to aim, and to fire, all at once. Many skilful marksmen never take aim by following the mark with the gun as it moves, (called "making a poke shot,"), but aim and fire instantly, called a "snap shot." This is especially the best way in trap-shooting, for a second's delay enables the object to get beyond safe range, as it moves very swiftly.

In hunting, besides the "snap shot," there is another method called the "swing-shot," in which the sportsman swings his gun, till it is a certain distance in front of the bird, and then fires. Some keep the gun moving steadily, some stop it at the moment of firing, and others give it a quick motion to one side. The distance of the point aimed at in front of the moving object depends on the speed of the latter and its distance from the gun, and must generally be learned by experience. If the object to be hit is a bird instead of something thrown from a trap, the rules for handling the gun are the same. Other details will be found in the article on HUNTING.

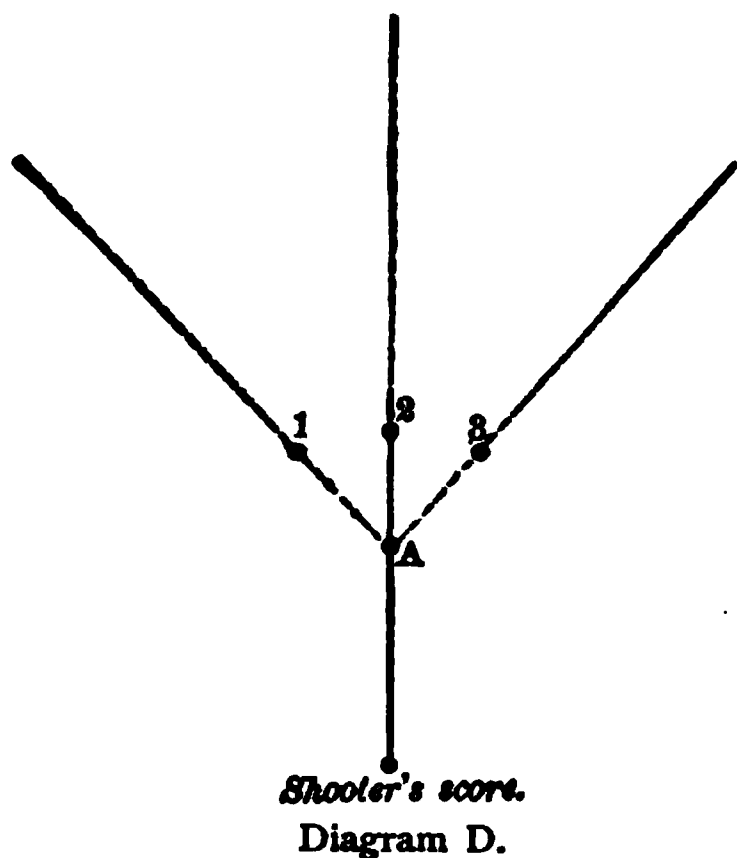
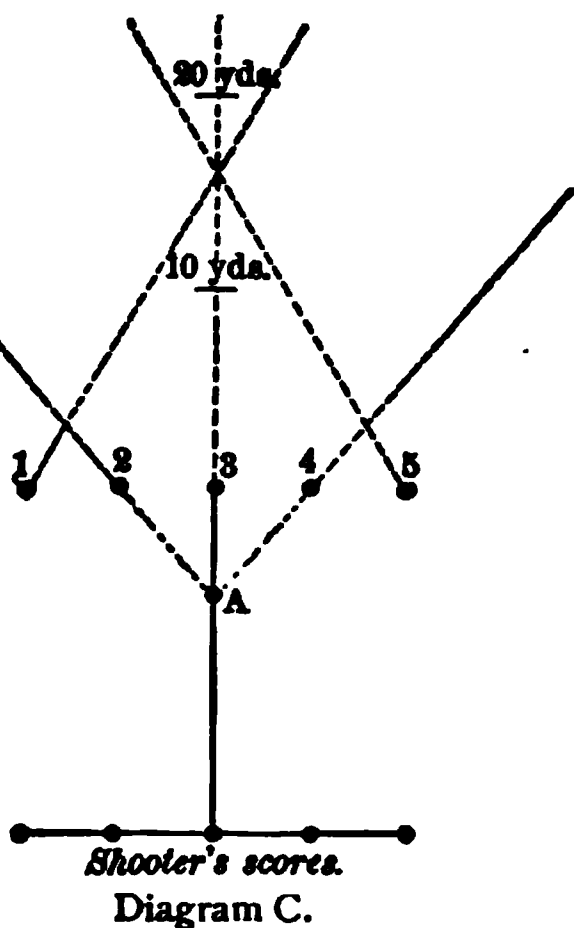
In trap-shooting matches each shot is scored as a hit or a miss. In one style of trap-shooting the com-

petitors who tie on their scores are divided into classes, and the several prizes are awarded to these classes. Thus if in a match at 10 targets each, with six shooters and 3 prizes, A and B hit 10 each, C, D, and E hit 9, and



F hits 8, the prizes are awarded thus: 1st to ties of 10, 2d to ties of 9, and 3d to F who scored 8. A and B, who tied on 10, may divide 1st prize, or shoot off to decide which shall have it; but the one

who is defeated in shooting off the tie receives nothing, and cannot claim 2d nor 3d, even though his score



is actually better than those of the winner of the other prizes.

RULES OF TRAP-SHOOTING.

The following rules for matches are selected from those of the American Shooting Association.

1. *Judges and Referee.* Sec. 1.—Two judges and a referee, or a referee alone, shall be selected to judge.

Sec. 2. If the judges cannot agree, the referee shall decide, and his decision shall be final in all tournament or sweepstake shooting.

Sec. 3. In individual matches a referee, scorer, and puller may be agreed upon and named by the contestants.

3. *Special Duties of Referee.* The referee shall see that the traps are properly set at the beginning of a match, and are kept in order to the finish. He shall endeavor to make the targets conform to the flight and direction indicated in Rule 12. He shall test any trap upon application of a shooter at any time, by throwing a trial bird therefrom. He may at any time select one or more cartridges from those of a shooter at the score, and must do so when the shooter is challenged by a contestant, and he shall publicly test the same for proper loading; if a cartridge is found to be improperly loaded, the shooter shall suffer the penalty as provided for in Rule 16.

4. *Balk.* If any contestant is balked or interfered with, or there is other similar reason why it should be done, the referee may allow another bird.

5. *Shooter at the Score.* In all contests the shooter must be at the score within three minutes after his name is called to shoot, or he forfeits his rights in the match.

6. *Scorer.* A scorer shall be appointed by the management whose score shall be the official one. All scoring shall be done with ink or indelible pencil. The scoring of a lost bird shall be indicated by a 0, and of a dead bird by a 1.

7. *Keeping the Score.* Sec. 1. The call for a broken bird shall be "Dead bird," and the call for a missed bird shall be "Lost bird."

Sec. 2. When two judges and a referee are serving, one of the judges shall announce the result of each shot distinctly, and it shall be called back by the scorer. If the second judge disagree with the

decision of the judge calling, he shall announce it at once before another bird is thrown, and the referee shall decide it. In the event of another bird being thrown before the referee's decision, the bird so thrown shall be "No bird."

8. *Broken Birds.* A bird to be scored "Dead bird" must have a perceptible piece broken from it while in the air; a "dusted" bird is not a broken bird. No bird shall be retrieved for shot marks. If a bird be broken by the trap, the shooter may claim another bird, as provided for in Rule 19; but if he shoots, the result must be scored.

9. *Announcing the Score.* At the close of each shooter's score the result must be announced; if claimed to be wrong, the error, if any, must be corrected at once.

10. *Screens.* Either pits or screens, or both, may be used, but the screens must not be higher than is actually necessary to fully protect the trapper.

11. *Arrangement of Traps.* All matches shall be shot from three or five traps, set level, five yards apart, in the segment of a circle (see Diagrams A and C), or in a straight line (see Diagrams B and D). When in a segment of a circle, the radius of the circle shall be eighteen yards. In all cases, the shooter's score shall not be less from each trap than the rises provided for in Rule 14. The traps shall be numbered from No. 1 on the left to No. 3 or No. 5 on the right, consecutively, according to the number used, as shown in the diagram.

12. *Adjusting Traps.* Sec. 1. All traps must throw the birds a distance not less than 40 yards nor more than 60 yards, and each trap must be tested for this standard distance before the shooting begins. If any trap be found too weak to throw the required distance, a new trap or spring, that will, must be substituted.

Sec. 2. The lever or projecting arm of the trap shall be so adjusted that the elevation of the bird in its flight at a distance of 10 yards from the trap, shall not be more than 12 feet nor less than 6 feet, and the angles of flight shall be as shown on the diagrams.

Sec. 3. After the traps are set for these angles, if the bird for any reason shall take a different course, it shall be considered a fair bird, provided the trap has not been changed.

13. *Pulling the Traps.* Sec. 1. The puller shall be placed at least six feet behind the shooter, and when the shooter calls "Pull," the trap, or traps, shall be instantly sprung. In single bird-shooting, he shall pull the traps as decided by a trap pulling indicator, if one is used.

Sec. 2. Traps may be pulled in regular order from Nos. 1 to 3, or 1 to 5, or *vice versa*, if so decided by the management.

Sec. 3. If the shooting is from traps to be pulled in regular order, the shooter may refuse a bird from a trap not so pulled; but if he shoots the result shall be scored.

Sec. 4. If the trap is sprung before, or at any noticeable interval after the shooter calls "Pull," he can accept or refuse the bird; but if he shoots the result shall be scored.

Sec. 5. Should any puller not pull in accordance with the indicator, he shall be removed, and another puller substituted.

14. *The Rise.* In single bird shooting the rise shall be:

18 yards for 10-bore guns.
16 yards for 12-bore guns.
14 yards for 14 and 16-bore guns.
13 yards for 20-bore guns.

In double bird shooting the rise shall be:

16 yards for 10-bore guns.
14 yards for 12-bore guns.
12 yards for 14 and 16-bore guns.
11 yards for 20-bore guns.

15. *Calibre and Weight of Gun.* No gun of larger calibre than a 10-bore shall be used, and the weight of all guns shall be unlimited.

16. *Loads.* Charge of powder unlimited. Charge of shot:

For 10-bore guns, 1 1-4 ounces.

For 12-bore guns, 1 1-8 ounces.

For 14 and 16-bore guns, 1 ounce.

For 20-bore guns, 7-8 of an ounce.

17. *Loading Guns.* In single bird shooting, only one barrel shall be loaded at a time, and the cartridge shall not be placed in the barrel until after the shooter has taken his position at the score. In double bird shooting both barrels shall be loaded at the score. Cartridges must be removed from the gun before leaving the score.

18. *Position of Gun.* Any the the shooter may adopt.

19. *Allowing another Bird.* (Known or Unknown Angles.)

Sec. 1. The shooter shall be allowed another bird for the following reasons:

A—For a bird broken by a trap.

B—For any defect in the gun or the load, causing a miss-fire.

Sec. 2. When the shooting is at known angles he shall have another bird from the same trap; but if the shooting is at unknown angles he shall have another bird from an unknown trap, to be decided by the indicator, except in case it be the last trap, when the shooter has a right to know which trap is to be sprung; in this case he shall have another bird from same trap.

20. *Single Bird Shooting.* Each contestant shall shoot at three or more birds before leaving the score, when the traps are set in the segment of a circle. If two birds are sprung at the same time it shall be declared "No bird."

21. *Double Bird Shooting.* Both traps must be pulled simultaneously, and each contestant shall shoot at three pairs consecutively, thrown as follows: If three traps are used, the first pair shall be thrown from

traps 1 and 2; the second pair from 2 and 3, and the third pair from 1 and 3. If five traps are used, the first pair shall be thrown from traps 2 and 3, the second pair from 3 and 4, and the third pair from 2 and 4. If only one bird is thrown it shall be declared "No birds." If a bird is lost for reasons stated in Rule 19, it shall be declared "No birds." If one be a fair and the other an imperfect bird it shall be declared "No birds." If both birds are broken by one barrel it shall be declared "No birds." If a shooter fire both barrels at one bird intentionally, it shall be scored "Lost birds;" but if the second barrel be discharged accidentally it shall be "No birds."

Summary. A contestant must shoot at two whole birds while both are in the air, and break or miss one with each barrel to have his score count, and the referee shall be as prompt as possible in calling "No birds," and prevent unnecessary shooting when a bird is broken by the trap.

22. *Rapid Firing System.* When the traps are set in a straight line and the rapid firing system is to be used, there shall be a screen before each trap on which shall appear the number of the trap, from No. 1 on the left, and each shooter shall stand at score opposite the trap from which the bird is to be thrown for him to shoot at; after he has shot at his first bird he shall pass to next score to the right, and so continue until he reaches the end of score, when he shall return to the score opposite No. 1, and continue as before until his score is finished. If shooters are annoyed or there is delay in shooting by the smoke of previous shots, the traps may be pulled in reversed order, commencing with the trap on the right.

History of Trap-shooting. Until about 1875 live wild pigeons were used for targets at shooting-matches. They were thrown into

the air by spring traps much like those just described, and shot on the wing. Sometimes several thousand were killed in one match. Those that were missed escaped, but many were only wounded, and the sport was a cruel one, so Captain Bogardus, a well-known marksman, suggested that hollow glass balls should be used instead. As these represented birds neither in shape nor in manner of flight, George Ligowsky, a Cincinnati sportsman, invented the saucer-like "clay pigeons" which, with various other artificial targets, have nearly everywhere taken the place of live birds in shooting-matches. Skilled marksmen have shown wonderful accuracy in trap-shooting.

Trap-shooting is said to have been the means of greatly improving modern shot-guns, as it has shown marksmen that the old guns were not fit for firing at such swiftly-moving small objects.

Rifle Shooting. The rifle is described in C. C. T. As the range of this weapon is so great, even more attention must be paid to holding and aiming, than with the shot-gun. In hunting, the rifleman often rests his rifle on a tree or fence to take aim, but no such rests are allowed in target shooting. In

forward, and the right foot placed a step behind the left. The right hand holds the stock with the thumb uppermost, and the forefinger hooked around the trigger. The left arm, with bent elbow, holds the rifle barrel. The marksman bends his head to the right, touching the stock with his cheek, and closing his left eye, looks with the right along the barrel, bringing both sights into line. He aims first below the target, then raises the rifle slowly, pauses an instant just as the target is in line with the sights, and then pulls the trigger. The butt of the rifle should be held firmly to the shoulder, to counteract the recoil of the weapon. Nearly every one holds his rifle a little dif-



ferently. Some riflemen kneel on the right knee in firing, and rest the left elbow on the left knee, sitting either on the heel or side of the right foot. In long-range shooting the marksmen usually sit or lie on



firing a rifle from an upright position the left shoulder is thrown

the ground, and there are many positions, some of which are curious. Long-range shooting is difficult, for the marksman has to make allowance for the force of the wind, the attraction of gravity, and the drift or deviation of the ball caused by the twist of the rifling. To correct the aim for the wind and for

drift, the rear sight is often arranged so that it can be shifted sidewise, and the rifleman must know just how much to move it for a given range and force of wind. Rifleman describe the direction of the wind by the numerals on a clock-face. The marksman is supposed to be standing in the middle of the clock-face, and the target is at the figure XII. A wind directly from right to left is then blowing from the figure III., and is called a "Three o'clock wind." A wind from a point just to the left of the target is called an "Eleven o'clock wind," and so on. Gravity pulls the ball down so much in going a long distance that in firing at a range of 1000 yards the rifle must really be aimed at a point about 80 feet above the target, but the rear sight can be moved up and down, so that the sights are in line with the target while the rifle is actually pointing above it. If the sights of a rifle get out of line, the rifle should be fixed in a vise and fired at a target. The sights must then be fixed in line with the hole made by the bullet.

Rifle-Matches. In a rifle match the competitors shoot at several different distances, called ranges. At Creedmoor, on Long Island, there are ten ranges, one at every hundred yards, from 100 up to 1000, but all these are not used in the same match. The ranges selected depend on the ability of the contestants, and the kind of rifle used. In a beginner's match with Flobert rifles, for instance, the ranges might even be 10, 25, and 50 feet. The targets are usually the same for each range, the distance being regulated by the places (called firing-points), at which the marksmen stand. Each competitor in turn fires a number of shots previously agreed upon, at the shortest range, and then the competitors go to the next firing-point. When two parties (called teams) are competing one against the other, the men in

the opposing teams fire alternately. In skirmish firing (introduced at Creedmoor in 1886), teams of six men fire at a time, advancing rapidly from one firing-point to another, till they have shot from all of them, and then retiring in the same way. Targets to be used in only one match may be made of wood, but permanent targets are made of iron painted white, with black division lines. After each shot an attendant (called the marker) notes where the bullet struck, and then covers its mark with white paint, after signalling the score, as will presently be explained. While he is so doing, a danger signal is displayed, so that no one may shoot when he is in front of the target. During the shooting he retires to a bullet-proof shelter. Behind the target should be a bank of earth, so that no shots may do harm. In a match not held on a permanent range, great care must be taken to set up the target against a hillside. With very small rifles, many people think it necessary only to see that there is a thick high fence, or the side of a building, behind the target, which may be made of paper pinned to the fence; but there are really no rifles which can be used thus safely. People have been killed by Flobert rifle bullets passing through a wall. The targets are square or oblong, and have painted on them three concentric circles. The space within the smallest is called the Bullseye, between that and the second the Centre, between the second and third the Inner, and the remainder of the target the Outer. Sometimes the Inner is bounded by a square instead of a circle. The size depends on the range. At Creedmoor there are three classes of targets. The first (Fig. 1), used at ranges of more than 600 yards, measures 6 by 12 feet. The Bullseye is 36 inches in diameter, the Centre 54 inches, and the Inner is a

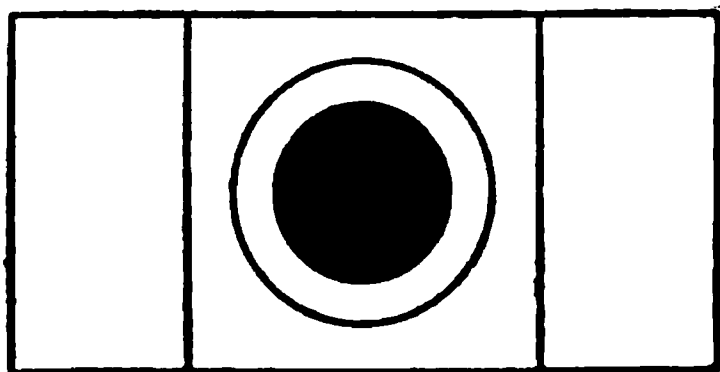


Fig. 1.

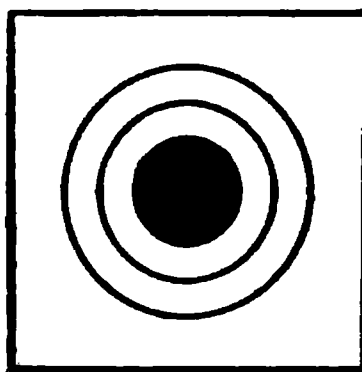


Fig. 2.

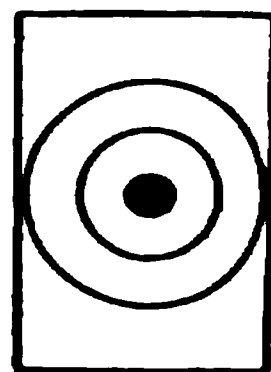


Fig. 3.

Plan of Targets.

square of 6 feet. The second class target (Fig. 2), used at ranges of from 300 to 600 yards, is 6 feet square. The Bullseye is 22, the centre 38, and the Inner 54 inches in diameter. The third class (Fig. 3), used at distances less than 300 yards, measures 4 by 6 feet. The Bullseye is 8, the Centre 26, and the Inner 46 inches in diameter. For very small distances the size should be still further decreased.

The marker signals the hits to the scorer in any way that may be agreed on. At Creedmoor a Bullseye is signalled by showing a white disk, a Centre by a red disk, an Inner by a white and black disk, and an Outer by a black disk. When a bullet hits the target after striking something else, it is called a *ricochet* (French for rebound), and is signalled by waving a red flag twice, from side to side, in front of the target. When a shot strikes the target support, the flag is raised and lowered thrice in front of the target.

The scores of the various hits are as follows:

Bullseye,	5
Centre,	4
Inner,	3
Outer,	2

RULES OF RIFLE SHOOTING.

The following rules for rifle matches are condensed from those of the National Rifle Association:

1. Rifle matches shall be in charge of an Executive officer, a scorer, and a Range officer.

2. The Executive officer shall have general control of the conduct of the match, and the Range officer shall have charge of all the firing points.

3. The competitors will be stationed not less than four yards in rear of the firing points, until called by the scorer to take position at the firing point. The scorer will sit close behind the firing-point stake.

4. As each shot is signalled, the scorer shall announce the name of the competitor and the value of the shot, and at the end of the score announce in like manner his name and total score. The score shall be open to inspection at all times by any competitor.

5. No sights must be used that cover the target so as to conceal the danger signal.

6. No artificial rests must be used.

7. A breech-loader must not be loaded, nor a muzzle-loader capped, before the competitor takes his position at the firing point.

8. Any objection to the record of a shot must be made before the next is fired.

9. When two shots strike the target simultaneously, the shot having the higher value shall be marked first, and the competitor whose proper turn it was to shoot will be credited with that value.

10. Any alteration in the score must be signed by the Range officer.

11. When the danger signal is displayed, competitors about to fire will be required to open the breech-lock of their rifles (if breech-load-

ers). If they leave the firing point, they must withdraw the cartridge.

12. No rifle shall be cleaned or wiped out except between ranges.

13. If any competitor is not ready to fire when his name is called, he shall forfeit his turn.

14. Competitors will be allowed one minute to each shot.

15. *Ties.* Ties shall be decided by the total score made at the longest distance; or if those scores are also tied, by the total score at the second distance. If that is a tie, then by the fewest outers in the entire score; by the fewest inners in the entire score; and by inverse order of shots, counting singly from the last to the first. In team shooting, if there be still a tie, the competitor making the highest score on each side shall fire five rounds at the longest distance.

16. Any competitor violating one of the rules, or refusing to obey an officer of the match, shall not be allowed to compete further.

17. Any competitor firing when the danger flag is shown, or knowingly discharging his rifle except at his target, shall not be allowed to compete further. This does not apply to a person accidentally firing at the wrong target when no danger signal is up.

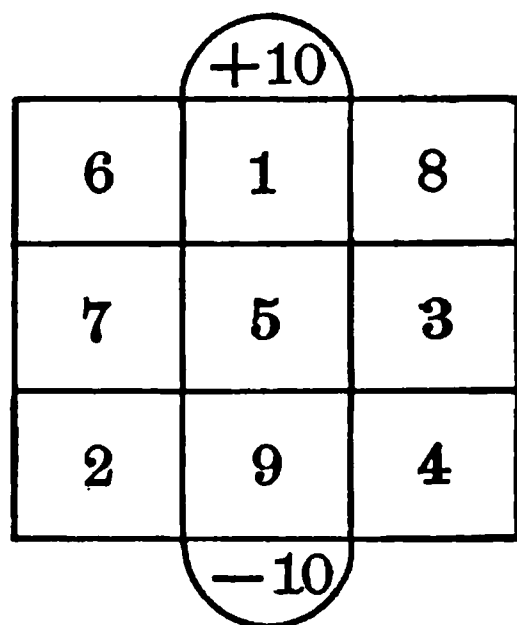
18. Any competitor found with a loaded rifle, except at the firing points when about to shoot, shall not be allowed to compete further.

19. Any competitor firing his rifle accidentally may be required to withdraw from the match by the executive officer.

History of Rifle Shooting. Rifle clubs have existed in this country for a long time, but scientific rifle matches and organized target practice began in 1873. The National Rifle Association was organized in 1871, and, with the aid of the State of New York, established in 1873 the rifle range at Creedmoor on Long Island, where many matches have since been held. About 25,-

000 men now shoot there every year.

SHUFFLE-BOARD, or SHOVEL BOARD, a game played by two or four persons with iron weights, which are slid along a board sprinkled with fine sand. The board is 30 feet long, with slightly raised edges to keep the weights from sliding off sidewise. Lines are drawn across the board five inches from each end, one for a starting line and the other for a finishing line. There are eight weights, or "pieces," weighing about a pound each, and divided into two sets of four each. The players are divided into opposing sides, and each side has one of the sets of pieces. Each player in turn, standing at the starting line, slides his pieces along the board. Each piece that projects partly over the edge of the board scores three points, and each that lies on the finish line or between it and the edge of the board is said to be "in," and scores two points. If no piece is in, the one nearest the line scores one. After a round has been played, the players go to the other end of



Ocean Shuffle-Board.

the board and play toward what was the starting line, and they thus change places after each round. Or the sides may play in opposite directions, each keeping its own end of the board. The side wins that first scores 21 points.

Shuffle-board is much played on

the decks of ocean steamers, but differently from the way just described. A figure is chalked on the deck like that shown below. The weights used are of wood, and are pushed from a distance of nine or ten paces by a long staff with a curved end. The players take turns, but nothing is scored till the end of the round, when each is given the number of points marked in the square occupied by his piece. An enemy's weight may be knocked out of the figure altogether, or a friend's shoved in, by a blow from a succeeding player. If a weight remain in the semi-circular space nearest the players, ten is subtracted from its owner's score. The winner must make exactly 50 points; all in excess of that number are subtracted instead of added; thus if a player's score be 46 and he make 8 more, 4 points are added to bring him up to 50, and the remaining 4 are subtracted, making the total still 46. In like manner 48 and 3 would make 49, and so on.

History. Shuffle-Board was played long ago in England, and its origin was probably similar to that of BOWLING, QUOITS, and CURLING.

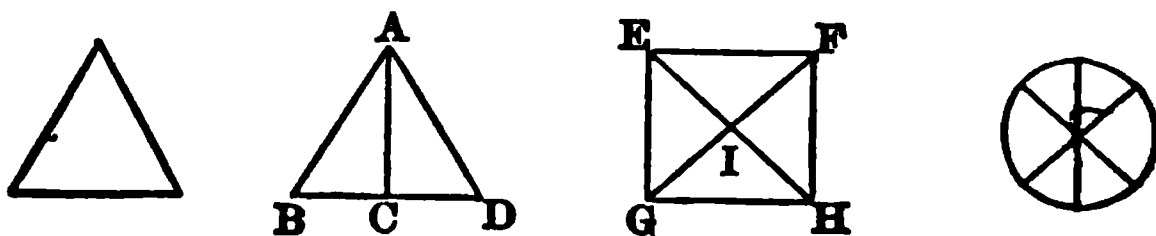
It was sometimes played on tables with pieces like checker-men.

Shuffle-Board was forbidden by law in the reign of Henry VIII., as one of the games that turned the people from the practice of ARCHERY.

SIEGE. See FOX AND GEESE.

SIMON SAYS, a game played by any number of persons, who sit in a circle, or around a table. The leader says, "Simon says thumbs up," holding out his clenched fist with the thumb uppermost; "Simon says thumbs down," reversing it; or "Simon says wiggle-waggle," moving his thumb back and forth. The rest of the players must imitate him whenever he uses the words "Simon says," but when he says simply "Thumbs up," "Thumbs down," or "Wiggle-waggle" no attention is paid to him and the position of the players' hands is not changed. If any one obeys the leader when he should not, or fails to obey when he should, he must pay a forfeit. The leader tries to give his orders in such rapid succession that some of the players will be confused and make a mistake.

SINGLE-LINE DRAWING. Puzzles are often given out in which it is required to draw a certain figure



Single-line Drawing.

without taking the pen from the paper or retracing a line. This kind of drawing may be called single-line drawing. Given any figure whatever, the following rule will tell whether it can be thus drawn, and if not, with how few lines it can be drawn.

Count all the points in the figure where an uneven number of lines meet. There will always be an even number of such points, if there are any at all. Half this number will

be the fewest number of lines with which the figure can be drawn. Thus, of the four figures shown, the first has no points where an uneven number of lines meet, the second has two, namely A and C (BC and CD counting as separate lines) the third has four, E, F, G, and H, and the fourth six.

Therefore, when a figure is given to be drawn in a single line, the first thing to do is to see whether it be possible so to draw it. Then, if it

be possible, begin at one of the points where an uneven number of lines meet, but if there are no such points, any point may be taken as the starting-point. When a crossing is reached, it is better always to adopt some one plan and to follow it on all similar occasions to avoid confusion. For instance, the line to the right of the one you are on may be taken, supposing that you are facing the direction of motion of your pencil. Or, you may plan so as always to cross a line, never taking the adjoining one. But if there is no system and you sometimes take one way and sometimes the other you will often find that you have left part of the figure undrawn.

SIPHON, an instrument for drawing liquid out of a vessel over the side. It consists of a U-shaped tube, one of whose branches is longer than the other. The tube is first filled with the liquid and then the shorter arm is dipped in the vessel, when the liquid will flow over the bend and out of the longer arm. A simple siphon may be made by bending a glass tube (see **CHEMICAL EXPERIMENTS**) or of a piece of rubber tubing. Instead of first filling the siphon with the liquid, the short end may be placed in the vessel and the mouth applied to the long end. The liquid is brought over by sucking it, and when it has started it will continue to flow. The action should not be started thus, of course, unless the liquid is harmless.

EXPERIMENTS.

1. Using a bent rubber tube for a siphon, raise and lower the outer end while the water is running. It will be found that the water will run faster the lower the end is, and will stop when the end is just on a level with the surface of the water. The reason is that the difference of weight of water in the two branches of the tube makes the water flow. The greater the differ-

ence, therefore, the faster the water will run, and when there is no difference at all, it will stop. The part of the small end that is under water does not count as part of the tube.

2. Plug the lower end of an argand lamp-chimney with a cork or rubber stopper through which passes the long branch of a glass tube bent into the form of a siphon, the bend and short branch being inside the chimney. Let water flow into the chimney through a tube much smaller than that used for the siphon. As soon as the level of the water reaches the bend of the siphon it will fill the siphon and be at once discharged. Then the supply-tube will fill the vessel again, and so on, the discharges taking place at regular intervals. This arrange-



Exp. 2. Tantalus's Cup.

ment is often called "the cup of Tantalus," from the old Greek legend of Tantalus, who was said to be doomed to stand up to his chin in water, which receded every time he tried to drink it. The illustration shows the form of the toy sold by makers of chemical apparatus. Cups are sometimes made containing figures of Tantalus, in which a siphon is concealed. Water is allowed to run in till it reaches the mouth of the figure, when it suddenly runs out. It is supposed by some people that intermittent springs, which flow at regular intervals, are natural siphons of this kind. The arrangement is used practically to "flush" or wash out sewer-pipes at regular intervals.

Cloth Siphon. Cut a strip of cloth an inch or two wide and about a foot long. Let one end dip in a glass of water raised six or eight inches above the level of the table by means of books, and let the

other hang down into an empty glass standing on the table. The cloth, acting as a siphon, will in a short time transfer the water from the upper to the lower glass.

SIREN, an arrangement for show-

Siren.

ing that musical notes are made up of a regular succession of noises. A simple one can be made by having cut out a disk of sheet-iron about a foot in diameter, with holes large enough to admit a lead-pencil around the edge. A similar row containing half as many holes is made a little nearer the centre. The holes in each of these rows must be at equal distances apart. The disk has also a hole in the middle

so that it can be fastened to a **TWIRLER**. A glass tube, drawn out at one end to a jet (see **CHEMICAL EXPERIMENTS**), is fixed to the end of a rubber tube. The other end of the tube is held in the mouth, while the jet is held pointing toward one of the holes in the disk. The twirler is now turned, and by blowing through the tube a succession of puffs is heard as the stream of air passes through the holes. By turn-

ing faster this series of noises can be made to pass into a musical note, though in this rough form of siren it is mixed with a whistling or hissing sound. The faster the disk twirls the higher the note is, and the smaller row of holes always gives a note an octave lower than the other. If the disk is large enough, the notes of the musical scale can be formed by making eight rows of holes containing successively the following numbers, or numbers proportional to them: 24, 27, 30, 32, 36, 40, 45, 48. If a glass tube having a cork in one end be placed with its mouth toward the disk, as in the illustration, the sound will grow suddenly louder when the disk reaches such a rate of speed as to give the note to which the tube responds, and this may be varied by pushing the cork backward or forward in the tube.

SIXTY-SIX. See BÉZIQUE.

SKAT, a game of CARDS, played by three, four, or five persons, with a EUCHRE pack. Only the three at the dealer's left take active part in the game at a time. The dealer gives five cards to each active player, lays two cards face downward on the table to form what is called the "Skat," and then deals five more cards to each. The cards may also be dealt three, four, and three at a time, or two at a time, in which case the skat may be laid out between any two of the rounds.

The privilege of playing any one of several different games is now sold to the highest bidder, as follows:

The eldest hand first decides on the game that he can play best, depending on the cards in his hand, and says, "I ask." (The names of the different games, and the values of the corresponding bids, are given below.)

The player on his left then makes his bid, by mentioning the kind of game he can play best, and the eldest hand, if its value is larger than his own estimated bid, says, "I pass."

If his own bid is the larger, he says "Yes," and then the other may bid again or pass. This is repeated till one or the other passes. The third active player then bids against the one that did not pass, in like manner. When bidding is over, the highest bidder announces the name of his bid and playing begins. The object of the highest bidder is to make 61 points in the hand. If he does, he scores the amount of his bid; if not, each of the others, including the silent players, if there are any, scores that amount. (An exception, in the case of the bid called "Null," is explained below.) In playing, suit must be followed, but if that is impossible any card may be played. In reckoning the necessary 61 points, the cards count as follows for the player taking the trick containing them:

Ace,	11.
Ten,	10.
King,	4.
Queen,	3.
Knave,	2.

The Nines, Eights, and Sevens have no counting value.

In the lay suits the rank of the cards, beginning with the highest, is Ace, Ten, King, Queen, Nine, Eight, Seven. The four Knaves, which are always the highest trumps, are called "Matadores." and their rank, beginning with the highest, is Knave of Clubs, Knave of Spades, Knave of Hearts, Knave of Diamonds. (The bid "Null" is an exception to this also, as explained below.) All trumps count as Matadores in bidding.

The Bids. In some of the bids the suit on which they are based must be mentioned, and the value depends on the trump and on the number of Matadores held, as will be explained. The bids are as follows:

1. *Simple Game, or Simple.* When the highest bidder has bid a simple, the suit named in his bid becomes trumps, unless he chooses to change

it to a higher suit. (The suits rank is the same order as the Matadores.) The successful bidder takes the Skat into his hand, and then discards two (including one or both of the Skat cards if he wishes).

2. *Tourné* (toor-nay). The successful maker turns up as trump one of the Skat cards, and then, taking the Skat into his hand, discards as in simple. But if the turned-up card is a Matadore or a Seven he may change his bid as explained under *Grand Tourné*, and *Null Tourné*.

3. *Solo*. The trump is the suit announced by the highest bidder in his bid, or he may change it to a higher suit. The Skat is not looked at till the close of the hand, when the value of its cards is added to the lone player's count.

4. *Grand Solo*. This is like Solo, except that no suit is announced with the bid, and the only trumps are the four Matadores.

5. *Grand Ouvert*. Like Grand Solo, but after the first trick is taken all play with their cards lying face upward on the table.

6. *Grand Tourné*. When the highest bidder has bid *Tourné*, and turns up a Matadore, he may change his bid to Grand, still taking up the Skat cards, but he may not change if he has looked at the other Skat card.

7. *Null Solo*. The player making this bid undertakes to win no trick at all, otherwise he loses. No points are reckoned, the Knives cease to be Matadores, and the cards rank as in whist. There is no trump, and the lone player plays without the Skat.

8. *Null Ouvert*. The same as Null Solo, except that after the first trick the hand of the bidder is laid face upward on the table, while his opponents play as usual.

9. *Grand Null Ouvert*, or *Revolution*. The cards of all the players are turned face upward on the table before the first card is led. The

opponents of the highest bidder can exchange what cards they please before playing begins, and can also consult during the game. The lone player takes the Skat into his hand

10. *Null Tourné*. When the bidder of *Tourné* turns a Seven he may change his bid to Null, before looking at the other Skat card. He takes the Skat into his hand as before, but there is no trump.

11. *Null Tourné Ouvert*. After taking up the second Skat card in Null *Tourné* he can again change his bid and play as in Null *Ouvert*.

It will aid the learner to remember these bids if he recollects :

1. That in *Tourné* bids (French *Tourné*, turned) the Skat cards are taken into the hand, and that one of them is turned for trump (though in *Grand Tourné* and *Null Tourné* it does not count as such) ;

2. That in *Solo* bids (Italian *Solo*, alone) the Skat is not looked at till after playing is ended ;

3. That in *Grand* bids the four Matadores are the only trumps ;

4. That in *Ouvert* bids (French *Ouvert*, open), one or more hands are exposed while playing ; and,

5. That in *Null* bids the rank of the cards and method of counting is changed.

It will be noted that with some of these bids it is much easier for the bidder to make his 61 points than with others, and they are accordingly given different values, which the winner adds to his score as before stated. The value of any bid is calculated by multiplying its unit-value (given below) by a number depending on the Matadores in hand and other things, as explained farther on. The unit-values are as follows :

	In Diamonds, Hearts, Spades, Clubs			
Simple,	1	2	3	4
<i>Tourné</i> ,	5	6	7	8
<i>Solo</i> ,	9	10	11	12
Grand <i>Tourné</i> , 12 ; Grand <i>Solo</i> , 16 ;				
Grand <i>Ouvert</i> , 24. Null <i>Tourné</i>				

16; Null Solo, 24; Null Tourné Ouvert, 32; Null Solo Ouvert, 48. Revolution, 72.

It will now be explained how the numbers are obtained by which the unit-values must be multiplied.

Matadores. In announcing any bid except a Null bid, the bidder must say how many Matadores he has in unbroken order, beginning with the highest. In bidding, all trumps count as Matadores. If he has not the highest Matadore (Knave of Clubs) he can announce none. If he has the highest but not the next, he bids "with one Matadore," no matter how many lower ones he has. If he has the highest three, but not the fourth, he must bid "with three Matadores," and so on. In the bids where the Skat cards are not looked at till the playing is over, any Matadores in the Skat count in reckoning the value of the hand. Thus if a player bid "with three Matadores," having also the fifth, and the fourth is in the Skat, his bid is reckoned as if it had been "with five Matadores." Absence of Matadores counts the same as their presence, as without these cards the difficulty of winning is increased. Thus, if a player has *not* the highest, he can bid "without one Matadore;" if the highest three are wanting, "without three Matadores" and so on. In forming the multiplier of the unit-value. bids with or without 1 Matadore count 1; with or without 2 Matadores count 2; with or without 3 Matadores count 3; and so on.

Schneider and Schwartz. If a player make 91 points in playing he makes his opponents Schneider (German *Schneider*, a tailor), and if he makes all the points (120) he makes them Schwartz (German *schwartz*, black). In these cases he is also said to win Schneider or Schwartz. If he lose, and his opponents make 91 or 120 points, they win Schneider or Schwartz.

A player may bid to make

Schneider or Schwartz, in which case he loses altogether if he does not do so. The value of these points differs according as they are made when bid or not bid. They count toward forming the multiplier as follows:

Schneider made, not bid,	1.
Schneider bid and won,	2.
Schwartz made, not bid,	3.
Schwartz bid and won,	4.

(The loss of a player when he bids and loses Schneider or Schwartz is told below).

The value of a bid is found by taking its unit-value, and multiplying by the sum of the points for Matadores and Schneider or Schwartz, plus one. Thus, to find the value of a Spade-Tourné bid, without four Matadores, in playing which a Schneider is won:

The Unit value is 7.

Four Matadores count 4.

Schneider won, not bid, counts 1.

We must therefore multiply 7 by $4 + 1 + 1$, or 6, and obtain 42 as the value of the bid. This seems difficult at first, but with a little practice the value of any bid can be told very quickly.

If a player bid to make Schneider and fails to make his 91 points, his opponents score what he would have scored had he won. If he fails to make even 31 points, making himself Schneider, they score in addition what his bid would have been worth without his announced Schneider.

In the case given above, if the player had *bid* to make Schneider and won, he would have made 49. If he had lost, his opponents would score 49. If he was made Schneider in addition, they would score $49 + 35$, or 84.

The game of Skat differs according to the bid that is made, and to give an example of each would take too much space. The following hints may aid the beginner:

The highest bid on which 61 points are likely to be won should

be made. Making 61 points depends not so much on the counting-cards in hand as on those that are likely to be captured.

In those bids where the trump is turned, not made, the player should have high Matadores and other high cards to begin with.

Solo bids require stronger cards than bids where the Skat is taken into the hand.

Null should not be bid unless the player has three Sevens, and no commanding card in his hand.

Grand should usually not be bid without four Matadores, unless the other cards are very high.

In playing, the highest bidder should remember that all cards not in his own hand are against him (except when the Skat is not taken up). On the contrary, each of the opponents is in doubt as to whether his friend or his enemy holds any card that is not in his own hand. The opponents of the bidder can assist each other in many ways. It is better for the one at the left to get the lead, for then the other will play last, and can put on a counting-card or not, according as his partner or the lone player has taken the trick.

RULES OF THE GAME.

1. Before the game begins, each player draws a card from the pack. He who draws the lowest is dealer, and the others sit at his left in order, beginning with the holder of the next to the lowest, and ending with the holder of the highest card. If two players draw cards of the same value they must draw again.

2. The deal passes in order to the left, but if more than three play, the dealer is never an active player, cards being dealt only to the three in order at the dealer's left hand.

3. Each player must count his cards before he raises them, to make sure he has the right number.

4. If a misdeal is discovered before a card is led, there must be a

fresh deal by the same dealer; but if play begins while a player has the wrong number of cards, his side forfeits the game.

5. If players on both sides begin to play with the wrong number of cards, that hand does not count, and the deal passes to the next.

6. If a player deal out of turn and play has begun, the deal is good, and the next deal passes to the player on his left.

7. In case of two bids of equal value, the elder hand has preference.

8. The successful bidder may change his bid to a higher, but not to a lower one.

9. If a player revoke, his side loses the hand, unless the revoke is corrected before the next lead.

10. If a card be led, or played, out of turn, it must be withdrawn, unless all have played.

11. A card so withdrawn, or exposed in any other way, must be played afterward at the command of an opponent, unless such play would be a revoke.

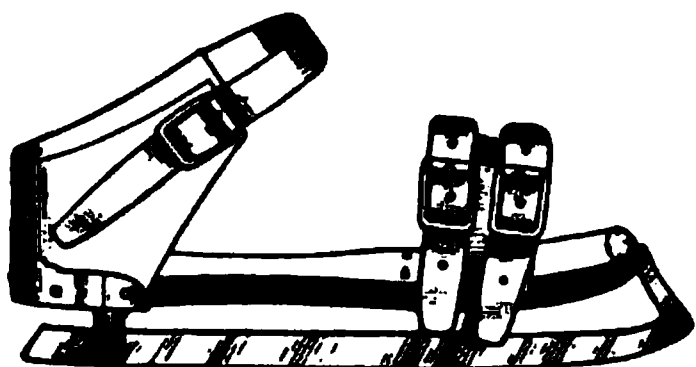
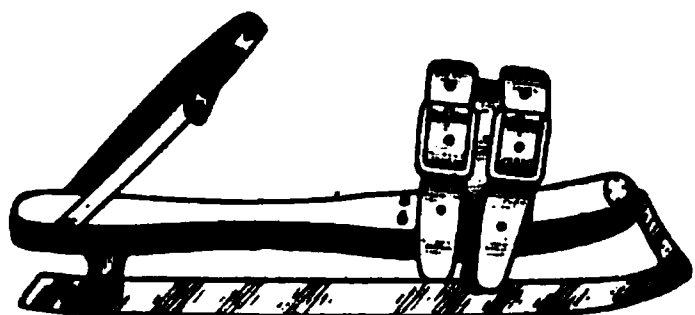
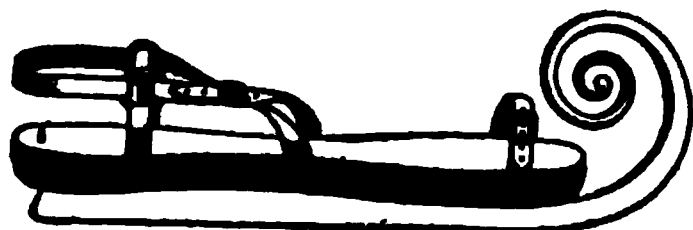
12. Only the last trick may be looked at.

13. If either or both of the Skat cards are lifted by one who is not entitled to do so, his side loses the game.

14. If the bidder, after the first trick has been played, and before the next lead, sees that he is sure to be beaten, he may throw down his cards and give his opponents their points, thus securing himself against being made Schneider or Schwartz.

History. Skat is a German game. It is said to have originated in Altenburg in the present century, and is probably a mixture of Hombre, Solo, and other games. It is very popular in Germany, where many different kinds of Skat are played. The kind described here, which is played in America, is called in Germany *Reichskat* (Regulation Skat).

SKATING. Skates are ground either perfectly flat on the bottom, or with a slight groove, so that the sharp edge holds the ice. The bottom may be straight, or slightly curved like a rocker. They were formerly always secured to the foot by straps, but now usually by clamps, fastening with a screw or lever.



Strap Skates.

In the strap skate, if a strap breaks it can be replaced in an instant or mended at any harness-maker's,



Clamp Skates.

whereas a broken clamp skate can usually be mended or replaced only with great trouble, unless the wearer lives in a city, and even then he must wait some time. But, on the other hand, the strap skate can be buckled securely to the foot only by pulling the straps so tight that they

interfere with the circulation of the blood, making the feet cold and uncomfortable. It also takes much time to put it on properly. Any clamp skate can be put on in a few seconds, but all are apt to come off under great strain unless the clamps have been properly adjusted. Those in which the clamps are fitted with spikes sometimes tear off part of the sole of the shoe. Screw skates are simple, and can be tightened easily; but the screw is apt to loosen, and in those where the strain comes directly upon it, it often breaks. Taking all things into consideration, a lever skate is best if it is properly used, but skaters with weak ankles should use a heel-strap in addition. Shoes with thick soles must be worn, that the pressure of the clamps may not bend them, and the clamps should be properly adjusted to the shoes once for all, so that the skates may be fastened by simply moving the lever, without a series of trials to see when the clamps fit properly.

The beginner's chief difficulty usually is to keep the ankles stiff. When this has been overcome, he may try walking on the ice on his skates. He will see that it is necessary to turn the foot that remains on the ice a little to one side to prevent its slipping back while he is advancing the other, and also that the less he lifts the forward foot the better, it being easier to slide it along the ice, while the rearward foot pushes. At the end of the slide, or stroke, the rear foot is brought forward ready to make a stroke in its turn. The skate-marks will be something as in Fig. 1. (In the diagrams, the full lines show the track of the left foot, the dotted ones that of the right. The footprint shows always the position of the skate at the beginning of the stroke.) At the end of each stroke, the foot which is about to leave the ice gives a sidewise push to give impetus to the other. The body

must be inclined so as to throw its weight on the advancing foot. The rear foot may now be held in the air till the forward one has finished its stroke, and the stroke may be lengthened by giving a more vigorous push, as in Fig. 2. Plain skating of this kind may be varied in several ways. Thus it may be changed to a motion resembling running, the strokes being nearly straight ahead and the push given by turning the toe slightly. This is

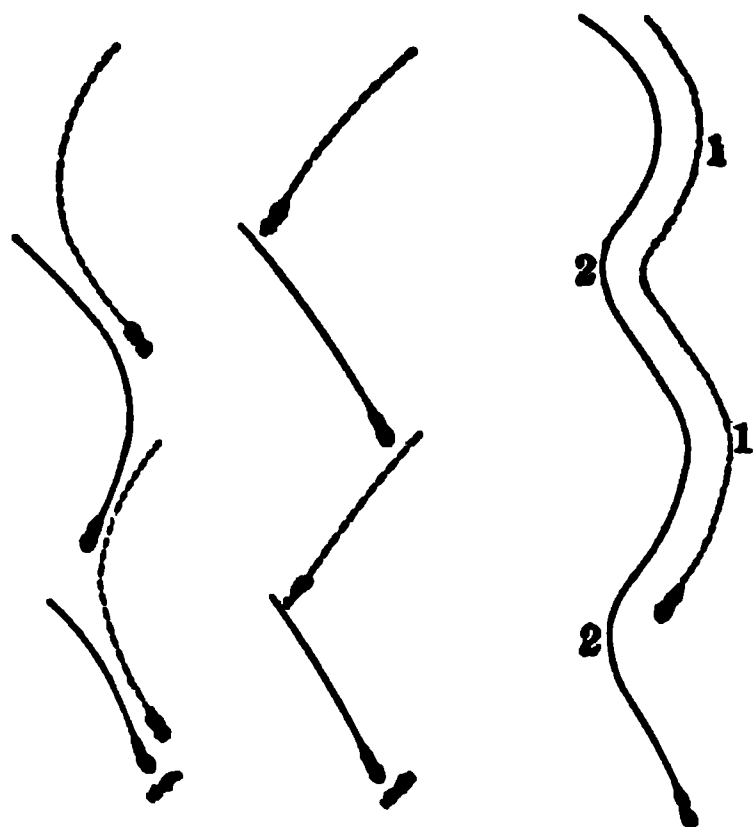


Fig. 1.

Fig. 2.

Fig. 3.

an awkward motion, but much used in playing running games, where quick dodging is necessary. The pushing foot, instead of being lifted from the ice, may remain on it, the push being given gradually so that the skate-marks are like Fig. 3.

A push is given by the left foot at 2, and by the right foot at 1, but after the stroke has been learned this push is scarcely perceptible even to the skater. The body is inclined in the direction of the stroke, as in ordinary skating.

From this point the skater should practise with a view to using the outside edge. If in making the stroke the opposite shoulder should be thrown a little forward, and the body inclined toward the advancing side, the skate will rest on its outside

edge and the skate-mark will be more of a curve, as in Fig. 4 or Fig. 5. To avoid changing to the inside edge of the skate, in giving the push for the next stroke, the rear

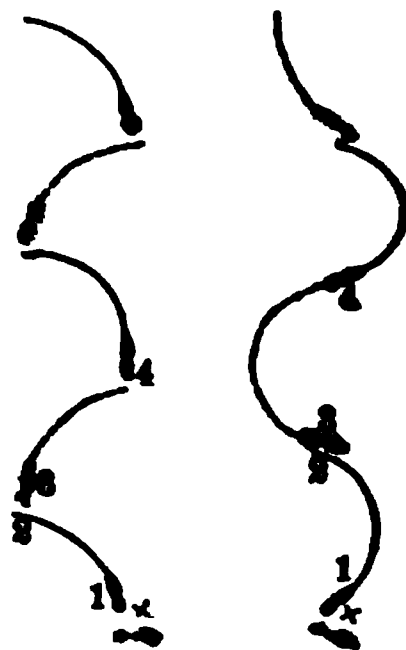


Fig. 4.

Fig. 5.

foot may be crossed over the advancing one in beginning the stroke,

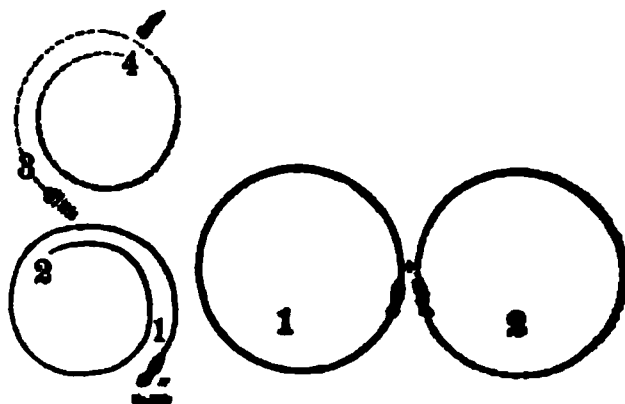


Fig. 6.

Fig. 7.

after being swung slowly around to aid the advancing foot in making

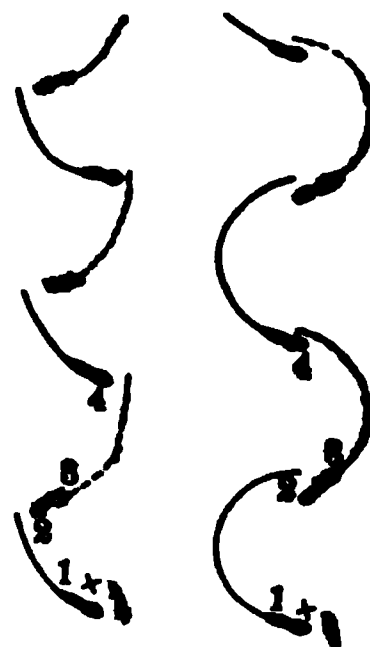


Fig. 8.

Fig. 9.

the curve. Skilful skaters can easily make a complete circle on

the outer edge of one skate, and another on the other in an opposite direction, as in Figs. 6 and 7, thus moving over and over on a figure 8.

Inside Edge. Figs. 8 to 11 show the same strokes made on the inside edge of the skate, which is somewhat more difficult.

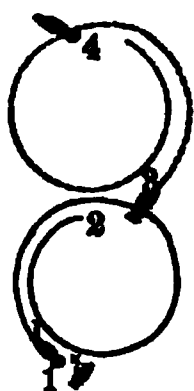


Fig. 10.

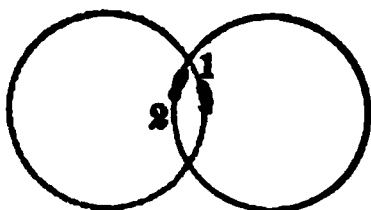


Fig. 11.

Combinations. By using the outside edge always with one foot and the inside with the other, a circle is described on the ice in the direction of the foot that skates on the out-



Fig. 12.



Fig. 13.

side edge. Each foot must be crossed over the other at the beginning of its stroke, but the foot on the outside of the circle must be crossed farther than the other. Figs. 12 to 15 show other combinations of inside and outside edge.

To skate backward, the learner must reverse the directions given above for skating forward, beginning by trying to walk backward slowly on his skates. By combining

the inside and outside edges, forward and backward, a great variety

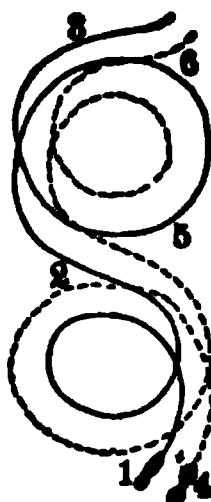


Fig. 14.



Fig. 15.



Fig. 16.

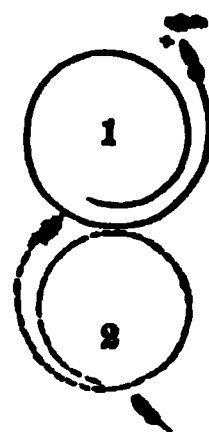


Fig. 17.

of fancy steps can be executed, of which hints for several are given in



Fig. 18.

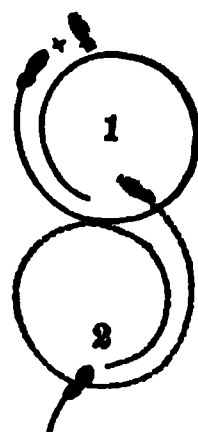


Fig. 19.

the diagrams. Figs. 16 to 22 show backward motions alone. Figs. 23

to 26, combinations of forward and backward. The simpler ones may be understood without explanation. In Fig. 13 the feet follow nearly the same path, the left leading. In Fig. 25 the feet both move forward at

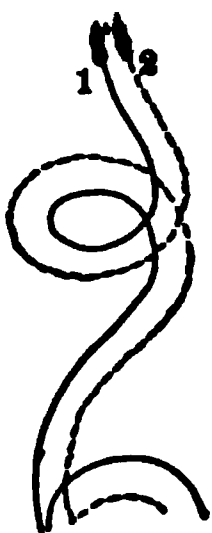


Fig. 20.

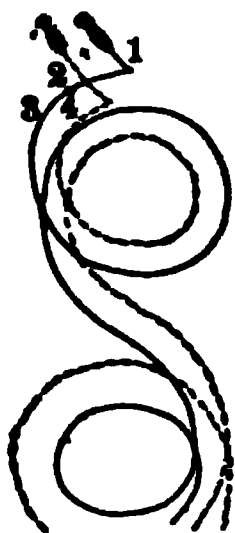


Fig. 21.

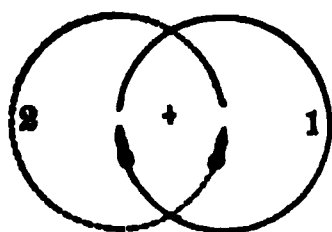


Fig. 22.

the left taking the inner and the

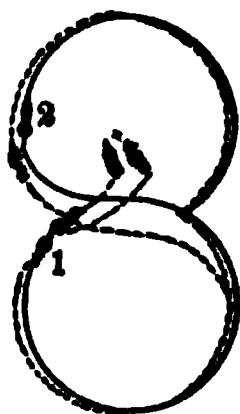


Fig. 23.

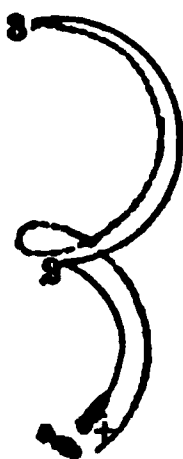


Fig. 24.

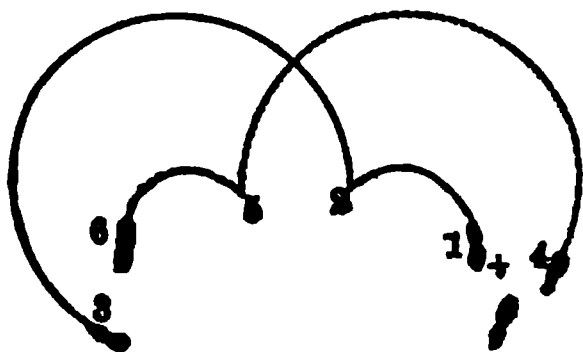


Fig. 25.

right the outer edge. In Fig. 26 there is a change from forward to backward, or the reverse, at each

angle in the curve. Fig. 27 shows attitudes in skating.

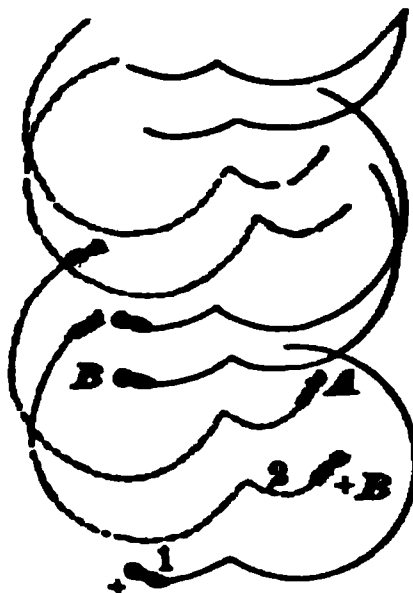


Fig. 26.

Stopping. When the skate runners are not curved up behind, the easiest way to stop is to rise on one or both heels, thus digging them into the ice. When the skates are curved behind, one skate may be held at right angles to the forward direction and tipped slightly, so that its edge will scrape. Another way is to place both feet in nearly a straight line, the heels toward each other, so that the skater describes a circle, till his motion is spent, or the feet may be held firmly at a slight angle with the toes pointing a little inward.

Safety. A skater may glide over unsafe ice by motion previously gained where it would be dangerous to make a stroke. Ice will also support one lying flat on it when it would break if he stood upright, because when he is lying down his weight is distributed, instead of pressing all on one spot. The strongest ice is that generally known as "black" ice, being perfectly clear and free from air bubbles. It is not really black, but perfectly transparent, and the skater over it can sometimes see objects at the bottom of the stream distinctly at a depth of fifteen or twenty feet. It appears black because it does not reflect the light of the sky, as bubbly or snow-ice does. Black ice half an inch thick, which

rests directly on the water, will bear a skater. It is very tough, and bends greatly before it breaks, little cracks running through it in all directions. Ice filled with bubbles is



Fig. 27.

not so tough, and ice which has snow mixed with it is weakest of all. Snow-ice two inches thick is no safer than black ice half an inch thick. It bends very little and cracks suddenly. In general, it is best not to venture on ordinary ice till it is three or four inches thick, and to examine carefully in a thaw. When the water in a pond or river falls after the ice has formed, the ice falls with it in the middle, but is held up by the shore on the edges. Near the shore, therefore, it is not supported by the water, and is more apt to break. It often parts from the shore by its own weight, or long cracks run along the banks with a loud noise, called "booming." Ice on any water is safe in some places and unsafe in others. Springs or currents of slightly warmer water may prevent the water from freezing, making "air-holes," or even large open spaces. The channel of a river, or the parts of a lake near the inlet or outlet, usually freeze last, because the water there is in motion; and when they freeze, they usually become covered with black ice, so that it is difficult to tell at a distance whether they are open or not. No skater should venture on such a place till

he knows it to be safe. On lakes surrounded by hills, gusts of wind often blow continually in certain places, keeping the water in motion, so that it does not freeze, and there are therefore large open spaces. When a skater is in doubt as to whether ice will bear or not, the best way is to test it by throwing a heavy stone on it. Should the skater find that he is on a weak spot, he should

not stop, but turn in a sweeping curve and get off as quickly as he can, without straining the ice by taking a stroke, if he is going fast enough. If necessary, he may lie down and roll to a place of safety. If he go through the ice and the water be over his head, there is nothing to do but to seize the edge of the hole and cry for help. As he goes in he should stretch out his arms on either side as far as possible. If he has slipped into an air-hole, the surrounding ice may be strong enough to let him climb out unaided. His companions should get a board or fence-rail and shove it out to him. If none is at hand, one skater should lie flat on the safe ice and one lying behind should push him, holding his feet, as near the hole as possible; another may, if necessary, lie behind the second, and so on until the line reaches safe ice. So long as each holds tightly, no one can be carried under the ice even if it break again.

Unless the weather is very cold the skater should not wear his overcoat. He may wear a knit woollen jacket under his coat. Skaters often build fires on the ice, which, especially at night, adds much to the

sport. A fire may be built on moderately thick ice without danger, for the layer of ashes that forms beneath it is a non-conductor of heat, and prevents the ice from melting.

Skating Contests. These are of two kinds—races and contests of skill in fancy skating. The former are usually governed by the same laws as running races (see **ATHLETICS**), and the latter are regulated by the rules given below, or similar ones. The programme of events is made out beforehand, and includes a number of well-known movements, ending with an exhibition of "specialties," in which each skater performs such other figures as he wishes. When a skater begins to execute his figure he is said to "take the surface." The judges decide at the opening of the contest on a scale of marking, which may range from 0 for the poorest up to 10 for the best.

RULES OF SKATING CONTESTS.

1. The judges shall, at the completion of each movement in a contest, mark on a slip of paper the number of points for each contestant, and deposit the slip in a closed box; these slips shall not be referred to till the close of the contest, when the judges shall foot up all the slips, and the number of points gained by each contestant shall constitute their award, which shall be final. In case of a tie the contest shall be decided by a general display of combined movements at the option of the contestants.

2. The order of taking the surface by each contestant shall be decided by lot, and the number of figures to be executed shall be determined as nearly as possible by the number of contestants.

3. No point shall be given for a movement under the head of specialties, if the skater who executed it has executed the same movement during the programme; but if the skater, under a particular figure ex-

ecutes a movement which the judges rule to belong to another figure, or to specialties, the skater shall have the right to execute that figure in its proper place.

4. In specialties, the leading contestant shall execute one specialty, which his opponent shall then execute if he can; the second contestant shall then execute another, to be copied by his opponent, if he can, and so on, leading alternately till the contestant whose turn it may be to lead shall not be able to execute any more, when he shall sit down, and the judges shall score on the merits up to that point.

5. When the contestant falls in executing any movement he shall forfeit one point; if, however, the judges unanimously consider the fall to have been occasioned by unavoidable accident (such as an obstruction in the surface, or the breaking of a skate), they may allow him to recommence the figure without forfeit. In specialties, a fall only counts against the skater in the particular specialty in which it occurs. When any part of the person except the feet or hands touches the surface, the skater is considered to have fallen.

Skier or Snow-skates. These hold a middle place between ice-skates and **SNOW-SHOES**. They are much used by the Norwegians, who are very skilful with them. Formerly regiments of soldiers in Norway were equipped with *skier*, on which they performed many remarkable evolutions; but the last body of this kind was disbanded in 1860. The *ski* is a strip of wood 5 feet long, 2½ to 3½ inches wide, and 1 to 1½ inches thick, tapering toward the ends, and having the toe turned up to the height of about 4 inches. The movement of the snow-skater is a sort of shuffle, and the skilful wearer can go on these skates very swiftly along a level surface of hardened snow, or even up a steep incline, by zig-zagging. Down-hill

motion requires no effort, the skater simply coasting, as on a sled.

Roller-skating. In 1819 skates having three rollers of copper in place of the runner were used in Paris, but they were not popular. On April 16, 1849, they were used in the same city in the skaters' ballet in Meyerbeer's opera of "The Prophet." But the first successful roller-skate was invented in 1869 by James L. Plimpton, of New York. It rests on four wooden wheels, two at the toe and two at the heel, so hinged that they remain flat on the surface even when the

foot is inclined to one side. The principle is shown in the illustration, in which *AB* represents the foot-piece, *RR* two of the rollers, *e* an inclined pivot on which the roller-axle turns, and which is fastened to the foot-piece at *a*. If the body inclines, turning over in the direction of the lower arrow, the foot-piece tips up as shown at *vx*, and the wheels are thrown around so that the skater moves off in the direction of the arrow *x*. The curve described by the skater is thus toward that side on which he inclines his body, just as in skating

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Principle of the Roller-skate.

on ice. Roller-skating began to be popular in the United States about 1875, and from 1884 to 1886 it amounted to what is often called a "craze." Every town had its rink, and there were few persons who did not at least try the sport; but since that time it has declined in favor. Many games were played on skates in the rinks, especially POLO. The principal difference between ice-skating and roller-skating is that the latter requires more exertion, since the friction is greater; but the motion is not quite the same, and a good ice-skater is often unable to use roller-skates the first time he tries them on.

History. Skating probably originated in the north of Europe, where skates have long been used to travel from place to place on the ice; but skating as a sport has been developed in temperate countries where there is less snow, such as England, Germany, Holland, and the United

States. In Holland, where there are many canals, skates are widely used.

The earliest skates were of bone fastened to the feet with cords. Such skates were used in London in the reign of Henry II., but the sport first became common in England in 1662, after the restoration of the Stuarts. It was not until 1830 that the first club devoted to figure-skating was formed in England, but since that time the art has been greatly developed, and hundreds of new figures invented, some of which require the co-operation of as many as eight skaters. American skaters also are very skilful in figure-skating, and they hold the best records for fast skating. The fastest times for various distances are given in the appendix.

In 1886 the National Skating Association was organized, and it has since held annual contests for the championship in or near New York

City. The events in these contests are races for one hundred yards, one furlong, quarter mile, half mile, one mile, five miles, ten miles, and twenty-five miles, and a trial of skill in figure-skating.

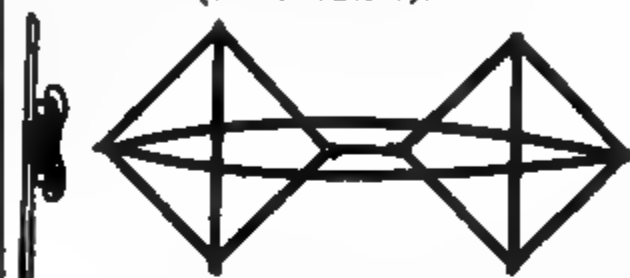
Skate-sailing. On a windy day it is possible to move very rapidly, let-



Skate-sailing.—Fig. 1.

ting the wind blow the skater along, especially if he hold out his overcoat

on both sides, or carry an open umbrella; but to get back, it is necessary to skate against the wind. If the skater carries a frame fitted with a sail, so that he may turn it at an angle with his course, he may with practice "tack" back like a sail-boat (see SAILING).



Skate-sailing.—Fig. 2.

There are several forms of skate-sails. The oldest is stretched on an

Skate-sailing.—Fig. 3.

oblong frame about three feet high by six feet long, and carried by a spar running horizontally along the middle. The "Cape Vincent" rig (Fig. 1) is triangular, the longest side being from eight to fifteen feet

long. The "Norton rig (Figs. 2, 3) invented by Col. Charles L. Norton (late president of the Canoe Club), of New York, consists of two sails, each about three feet three inches square, fastened together corner-

wise, about a foot apart, by a spar made of two strips of wood, as seen in the illustration. The skater stands between the sails (Fig. 3), thus having nothing to obstruct his view. The sails are kept stretched by being buttoned to the ends of the spar and yards, and are connected by a short rope. Any of these rigs may be made of light wood and stout cotton cloth. The rig is held firmly in the hands or under the arms, and any one who understands SAILING a boat will be able to move in any direction by its aid, if there is plenty of wind.

The English Rig is a small lateen sail (see Sailing) fastened to a mast which rests in straps bound around one of the skater's legs. He holds the rig by passing one arm around the mast, and grasping the upper spar with the other (Fig. 4). It has

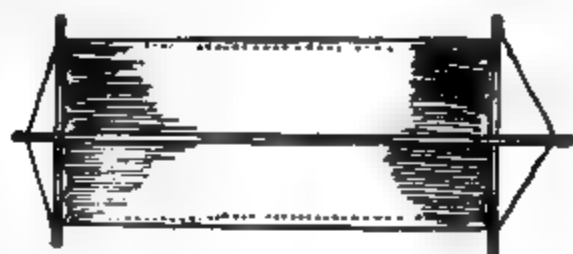
Skate-sailing.—Fig. 4.

the disadvantage of being fastened to the sailor, so that he cannot easily get loose in case of accident.

Skate-sails have long been in use in Norway, Denmark, and other northern countries (Fig. 5 shows one of the rigs used there), but they have only recently been introduced into this country. The sport has become popular in some towns.

The following rules are suggested by Colonel Norton for the governance of skate-sailing regattas. The

nautical terms are explained in the article on SAILING.



Skate-sailing.—Fig. 5.

RULES OF SKATE-SAILING.

1. Those on the port tack must give way to those on the starboard tack.
2. When moving side by side, or nearly so, on the same tack, those to windward must give way to those to leeward when requested to do so, if there is an obstacle in the course of the leeward most. But the leeward skate-sailor must go about or change his course at the same time as the windward skate-sailor, or as soon as he can without coming into collision. The new direction must be kept at least until the obstacle has been cleared.
3. When side by side, as in Rule 2, and approaching a windward obstacle, the leewardmost must give way when requested to do so. But the windwardmost must change his course at the same time as the leewardmost, or as soon as he can do so without coming into collision, and the new direction must be kept, at least until the obstacle has been cleared.
4. When running free, it rests with the rearmost ones to avoid collision.
5. Those running free must always give way to those on either tack.
6. Violators of any of the foregoing rules in the course of a race shall forfeit all claim to victory.
7. A touch, whether of person or of rig, constitutes a collision, either with another skate-sailor or with a mark or buoy, and he who is responsible for it, under the rules, forfeits all claim to the victory.

8. No means of locomotion other than that afforded by the wind are permissible during a race.

SKIPPING ROPE. See JUMPING ROPE.

SKIPPING STONES. See DUCK AND DRAKE.

SLAP-JACK, a game played by not more than ten persons, with a full pack of cards. The cards are dealt and placed as in EVERLASTING, but each player plays only one card at a time. When a Knave or "Jack" is thrown on the table, all the players try to slap it, and the one who does so first takes all the cards in the middle of the table and adds them to his pile. The object is to obtain all the cards, and he who does so is the winner.

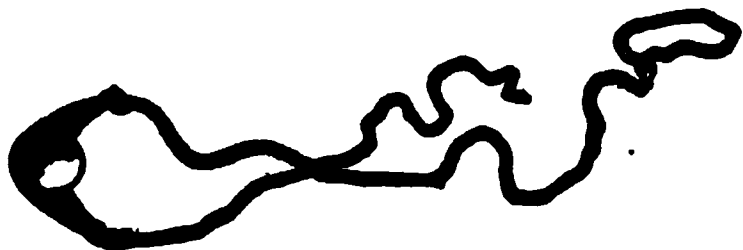
RULES OF THE GAME.

1. Each player must turn his cards face outward so that the other players will see them first.

2. No one, except the player, shall touch the table, or raise his hands above it till before seeing the face of the card that is being turned, and the player may do so only so much as may be necessary in turning and playing his card.

3. If one or more players slap a card that is not a Jack, the one that slaps first shall receive a card from each of the other players from the bottom of their piles.

SLINGING, the art of sending missiles with the sling. The simplest sling consists of an oblong piece of leather with a slit in the middle



Sling.

and a string fastened to each end. The end of one of the strings is looped. The slinger places on the leather a pebble which the slit holds in position, and holds the ends of the strings in his hand: one tightly,

aided by the loop, through which he passes his middle finger, and the other loosely. After whirling the sling around his head, he releases the loose string, and the stone flies off. Slings are made also entirely of leather. Practice is required to send the stone accurately, for unless the loose string is let go exactly at the right time it will fly off in the wrong direction. The best missiles to use are perfectly smooth and round clay marbles.

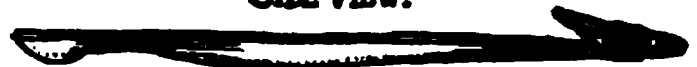
A kind of sling can be made by slitting a stick at the end so that it will hold a pebble securely, but not too firmly. The stick is held by the other end, and with it the pebble can be thrown to a great distance. Apples are sometimes thrown in this way, but they are usually stuck on the end of the stick, which is sharpened instead of being cleft. The reason why missiles can be thrown swifter and farther with the aid of a sling than with the hand is that the sling or stick adds, as it were, to the length of the arm. The longer the sling or stick, the swifter the pebble, provided it is not too long for the strength of the slinger's arm.

Throw-Stick, a sort of sling for throwing a lance or long arrow. It is cut from a flat piece of wood,

TOP VIEW.



SIDE VIEW.



Throw-Stick.

and has a projecting tooth at one end, as shown in the illustration. The thrower takes the throw-stick by the end opposite the tooth, and placing the butt of the lance against the tooth, supports it with the thumb and first finger of the hand which holds the stick. Releasing it, he propels it at the same time by a slinging motion of the throw-

stick, which can be learned only by practice. With one of these sticks, a skilled thrower can send a javelin much farther than with the hand alone. They are the invention of the natives of Australia, who use them in war and the chase.

Catapult, a kind of sling in which the missile is shot by force of a stretched elastic cord. Catapults may be bought at toy-stores, or made by selecting a forked stick in the shape of the letter Y, the prongs being about two inches apart, and fastening to each one end of a stout India-rubber band. The stem of the Y is held in the left hand, and a small pebble or shot being placed in the middle of the band, it is drawn out

Catapult.

as far as possible and then let go. The band, snapping back, sends the missile with great force. The size of the rubber band used depends on the strength of the shooter and the size of the missile. The weapon is improved by fastening a concave piece of leather in the middle of the band, to hold the missile. In this way a volley of bird-shot may be sent at once. Catapults may be used by skilled shooters with almost as much effect as fire-arms, and they are nearly as dangerous, not to the shooter, but to other people. Their use is usually forbidden by law in the streets of large towns and cities, but in the country they may be

made the source of much amusement.

Bolas, a kind of sling. One to catch birds may be made as follows: Six marbles, round stones, or leaden bullets are wrapped tightly in cloth, forming a sort of bag around each, and to each is fastened a piece of string about two and a half feet long. The other ends of the strings are tied together. The bolas is held by the tied end, whirled around the head, and thrown into the air, when the heavy ends will fly apart, so that the whole spreads over a space about five feet in diameter. A bolas thrown into a flock of birds generally brings one down, either

Bird Bolas.

by stunning or by entangling it.

History. The use of slings is probably older than that of bows and arrows. In the Bible, it is related

Saxon Slinger.

that in the time of the Judges there were 700 men of the tribe of Benjamin who were so expert with the sling that they "could sling stones

at a hair-breadth and not miss," using their left hands. The sling was early known in Europe, and the Romans, who used it as a military weapon, probably introduced it into Britain. The picture represents the manner of using it among the Saxons in the 8th century. Slings used with very large stones were sometimes attached to a staff three or four feet long, and whirled with both hands. As late as the 15th century an English poet, writing on "Knyghthode and Batayle" (Knighthood and Battle), advises every warrior to learn the use of the sling, because it could be easily carried and stones could be picked

Ancient Slingers.

up anywhere. The last illustration shows ancient slingers in a tower.

SLING THE MONKEY, a game played by any number of persons, one of whom takes the part of the Monkey. He is fastened to a branch of a tree by a rope, tied around his waist, of such a length that his feet can just reach the ground. All the players, including the monkey, are armed with knotted handkerchiefs. The monkey is "basted," or struck, by the others, and tries to baste them in his turn. If he succeeds in striking any one, that one must take his place.

The monkey should swing himself about by the rope from one side to the other, and, that he may have free play, the branch from which he is suspended must be at considerable height. Sling the monkey is a favorite game on shipboard.

Fox, a game resembling that just described, except that the monkey

is called the Fox, and can neither strike nor be struck while he is in his "den," represented by a circle marked on the ground. Even when he is out of his den he can strike only when he is standing on one leg, and if he put the other to the ground he must retire to his den before trying to strike again.

Baste the Bear, a kind of Fox, in which the player attacked, called the Bear, has no handkerchief, but is defended by another player, who takes the part of his keeper. The Bear must remain on his hands and knees and must keep some part of his body inside the den. The keeper holds one end of a rope, about four feet long, which is tied to the Bear's leg, and must not let go of it. The Bear may aid the keeper in any way, so long as he keeps on all-fours and does not go entirely outside of the den. Any player struck by the keeper's handkerchief must take the Bear's place. Each Bear is allowed to choose his own keeper.

SMALL TUBES, Experiments with.

1. Take a number of small glass tubes, varying in size from a thermometer tube to one quarter of an inch thick. Thrust the ends into water (Fig. 1), and the water will rise in each, but higher in the smaller tubes. The water also rises

Fig. 1.

Fig. 2.

higher at the side of the tubes than in the middle.

2. Put the tubes into mercury (see Fig. 2). The mercury will be lower inside the tubes than outside. It will sink lowest in the smallest tubes, and will be lower at the sides of the tubes than in the middle.

3. Hold two pieces of glass together like a wedge, and dip them sidewise into water and then into mercury. The water will rise higher

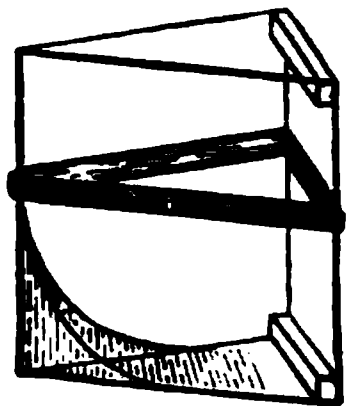


Fig. 3.

where the plates are close together, and the mercury will fall lower there. In each case the surface of the liquid will form a curve. Fig. 3 shows how two pieces of glass may thus be held

together by a rubber band, being kept apart at the wide-open side by two bits of wood. The curve made by the water surface within the wedge is also shown.

SMOKE RINGS, Experiments with. 1. Cut in the bottom of a pasteboard box a foot square a round hole about as large as a silver dollar. Over the open top of the box pin a handkerchief tightly. Fill the box with smoke by burning touch-paper in the hole (see AIR CURRENTS), or in any other way. Then by tapping on the handkerchief, as the box stands on its side, smoke rings will issues from the hole, like those which smokers sometimes blow from their mouths. The experiments described below may be performed with a box like this, but it is better to make a larger one as described in the next experiment.

2. Take a dry-goods box about two feet square, and saw a hole about three inches in diameter in the bottom (see Fig. 1). Tack tightly over

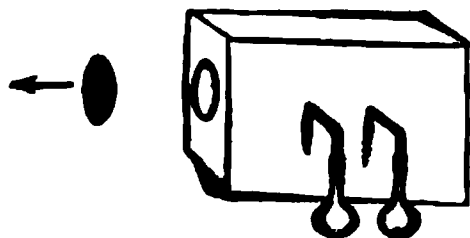


Fig. 1. Box for Smoke Rings.

the top a piece of heavy muslin, and stand the box on its side. To keep it full of smoke, place strong am-

monia in one flask or bottle and hydrochloric acid in another, and support them so that they can be heated beneath with alcohol lamps. Fit the corks with short tubes of bent glass or rubber whose ends pass through small holes into the box. By heating the flasks the fumes of the ammonia and the acid are thus led into the box where they mix, making a dense white smoke. It will not be necessary to heat the flasks all the time, but only at intervals when the smoke gets

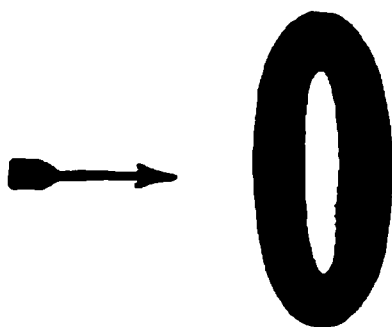


Fig. 2.

thin. By tapping on the muslin large and beautiful smoke rings are driven out of the hole in the box.

3. Tap lightly on the box; the ring will move slowly. Give a hard tap; it will go swiftly, thus the speed of the rings can be regulated at will.

4. Hold the hand or the face in front of one of the rings. Even if it be moving slowly a puff of air will be felt. The reason is that the particles of air in the ring are moving around and around, those on the outside backward and those on the inside forward. These latter make the puff of air, for though the whole ring may be moving forward slowly, its particles may be revolving quite fast. See Fig. 2, where the small arrows show the motion of the smoke in the ring, and the large one that of the ring as a whole.

5. Send a ring across the room against a lamp or candle. It will be put out.

6. Try experiments 4 and 5 without any smoke in the box. The result is the same. This is so because the rings are made of air. The only use of the smoke is to

make them visible. Where it is desired to blow out a candle with an invisible ring it is best to try first with a visible one, and then keep the box and the candle in the same positions so that the ring will be sure to strike the candle.

7. Send two rings from the box, one close after the other. If they are close enough the one in the rear will contract and go through the front one, which then, being itself in the rear, will do the same thing in turn. This will be repeated till the rings are broken up by rubbing against each other. In practice it is hard to make them do it more than once each.

8. This requires two smoke boxes. Send rings from both so that they will strike at various angles. They will bound from one another as if made of India-rubber. But if one

water it takes the form of a ring, which soon breaks up into several.

10. Another way of producing them is to drop hydrochloric acid into a weak solution of mercuric nitrate. The two liquids act on one another chemically, producing a cloud of mercuric chloride which descends into the vessel in the form of a vortex ring.

11. Smoke rings can be formed in water as shown in Fig. 3. Bore a hole in the side of a glass jar close to the bottom. Pass through the cork a glass tube reaching nearly to the bottom of the jar, bent at right angles near the top, and drawn out to a jet at its upper end. Half fill the jar with water, place the thumb over the hole, and hold the end of the jet in a candle flame. On re-

Fig. 3.

ring strike another flatly, as they move in exactly opposite directions, the two will simply grow larger and larger till they break, remaining in the place where they strike.

9. Rings similar to these can be formed in water by dropping into it a solution of permanganate of potash or some other bright-colored salt. As each drop descends in the

Fig. 4.

moving the thumb so that a little water may run out, some smoke will be drawn down into the bottle and

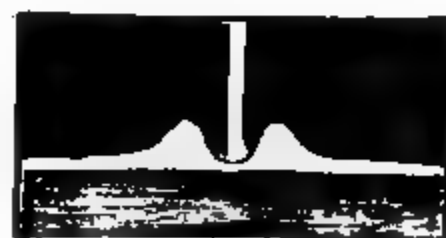


Fig. 5.

rise in a ring to the surface. If this be repeated a series of rings will be formed like those in Fig. 4. Fig. 5 shows a curious "collar" of

smoke formed around the bottom of the tube. In Fig. 3 the jar has a faucet in the hole at the side, but it can be stopped with a wooden plug just as well.

SMUT. See MUGGINS.

SNAKE'S TAIL, a game played by any number of persons, one of whom is selected as Catcher, and the others form in single file to represent a snake, the last player being called the Snake's Tail. Each player in the file places his hands on the shoulders of the one in front of him. At the opening of the game the Catcher stands about twenty feet from the head of the file, facing him, and at a signal tries to catch the Tail without pushing any one in the row. The Snake defends its tail by moving about in any way, but if the row breaks itself it is a foul, and the Tail is considered as caught. When the Tail is caught, he becomes Catcher in turn, and the Catcher takes his place at the head.

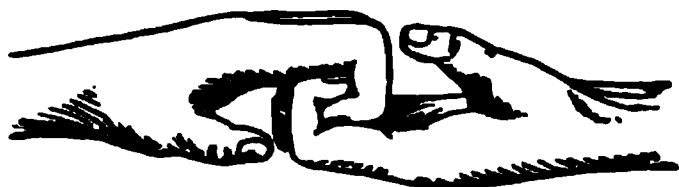
Another way of playing the game is to allow the Catcher to name any one in the row as the one he intends to catch. If he catches the one named, they change positions. The player at the head of the line may stretch out his hands to impede the Catcher's progress, but is not allowed to push him.

History. This is a Japanese game. Its name in Japan is *Hebi no o wo toro* (Catching the snake's tail). The second form of the game is called *Ko wo toro* (Will catch a child). The head of the row in this case is called the Mother and the other's children. The game begins by the catcher's shouting "Will catch a child." The Mother asks "Which child do you want?" and when the Catcher names his choice, she replies "Try to catch if you can," when the game begins.

SNAP, a game played by any number of persons with 36 cards. Each card bears a figure or design, and every design is on three cards. The cards are distributed equally,

and each player places his share, without looking at them, in a pile, face downward, before him. Each in order then turns over his top card and places it, face upward, as the beginning of another pile. When a player turns a card having the same design as one on the top of another player's exposed pile, both must say "Snap," and he who says it first takes the exposed pile of the other. When a player's cards are all turned, he reverses his exposed pile. Cards taken from other players are placed underneath the back-upward pile. He who gets possession of the whole pack wins the game.

SNAP THE WHIP, an out-door game played by any number of persons, who stand side by side in line, holding hands. The line is usually formed in order of size, the largest players at one end, and the smallest at the other. All run forward till three or four at the large end suddenly stop, causing the rest of the line to swing around sharply like the lash of a whip when it is snapped. The strain is so great that usually two or more of the players are forced to let go their hands, and those at the smaller end are thrown down if they are not careful. The game is best played on skates. In this case, when the line breaks, the fragments shoot off with great velocity, like stones from a sling. The best way to hold hands in this game is to form a sort of hook by bending all the fingers of one hand, and hold the neighboring player's hand as in the picture.

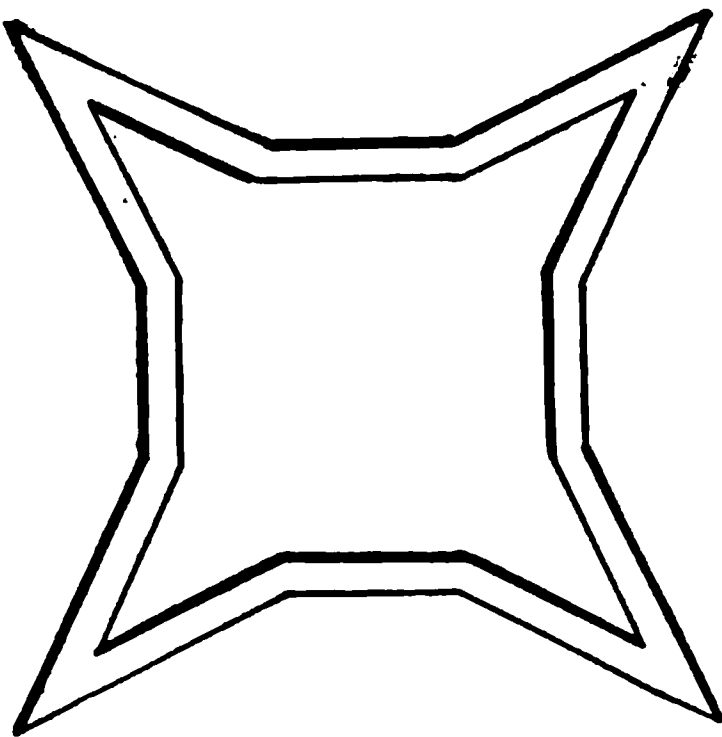


Butcher's Grip.

This arrangement (sometimes called the "Butcher's Grip") enables the player better than any other to resist a straight pull.

SNEEZING, a game played by any number of persons. A leader is appointed who gives to each a syllable ending in "sh," or some similar one sounding like part of a sneeze, as "ash," "esh," "ish," "osh," "oush," "aish," or "ashoo." At a given signal from the leader, all the company pronounce their syllables together. The effect is amusing, sounding like a sneeze if it is properly produced.

SNOWBALL FIGHTS, contests between two parties armed with snowballs. The object of one of the parties should be to drive the others from some position, which the latter strive to hold. This is generally a fort built of snow, and a snow fight should usually be the siege of a snow fort. One kind of fort is built of great balls of snow, made by rolling, which are placed in the desired form, and then cemented together with snow. To give such a fort a finished look, it should be smoothed, the wall being made sloping on the outside and perpendicular inside. Another way



to make a snow fort is to dig it from a drift, piling up on every side the snow taken out. If the drift is firmly packed, snow may often be taken out in great square blocks, with which a regular wall can be built. In making a fort, care should be taken to shape it so that the besiegers will be exposed to fire at all

points. The simplest form is a square, but if the besiegers advance close to the fort at the middle of one of the sides, it is not easy to fire at them except at the corners, and then the defender has to lean far over the wall, exposing himself too much. This fault can be remedied by making the fort the shape in the figure. In this way every point in the outside wall of the fort is exposed to fire from the inside. Here the best place for the besiegers to assault is on one of the sides of the points, for these are exposed to fire from one side only; whereas the part between two points is under fire from both sides. These principles are the same that have to be taken into consideration in building real forts. Snowballs should be made so they will sting when they strike, without doing any injury. They should therefore never be soaked in water, nor allowed to freeze. To use such missiles is like throwing stones, and a snowball fight with them ceases to be a sport. When the garrison of a fort is closely besieged, the best throwers are often stationed at the walls, while others make snowballs for them. The snowball makers, however, should be changed as often as possible to give them a share of the real sport. As soon as a certain number of besiegers succeed in getting into the fort, the victory should be given to them and the parties should change sides.

SNOW IMAGES. Images may be made of snow in two different ways: by sticking together balls or lumps of snow, or by making a mass of snow and then carving the image out of it. The former is the usual way, but better images can be made by the other method. The snow should be slightly moist, when a large mass may be collected by rolling a ball till it has gathered a great quantity. Another similar ball is then rolled and lifted to the top of the first. For a tall figure, a third

will be needed. The best tool to cut and shape the mass is a mason's trowel, but a shingle or other thin flat piece of wood may be used instead. In this way, figures of men, birds, and animals may be made.

If the arms of the image are to be extended, a stick should be thrust through the body so as to project on each side, and the snow moulded over it. An image often made by boys is that of a man fitted with an old hat, with cinders for eyes and a clay pipe in its mouth, and then used as a target for snow-balls. A snowballing match may be held with such a figure, as in the game of AUNT SALLY.

SNOW-SHOEING, walking on soft snow by means of snow-shoes, or wooden frames strung with thongs. Snow-shoes, which are shown in the illustration, are usually made each

frame to strengthen it, and it is then woven with thongs or tendons, so as to make a sort of basket-work. The shoe is from three to six feet in length, and from 12 to 20 inches wide. It is fastened to the foot by a toe-strap and two thongs that pass over the instep. The toe of the foot points toward the rounded end of the snow-shoe. That the foot of the wearer may not be hampered, the heel is left free to rise and fall without the shoe, and a hole is left in the basket-work under the toe-strap, into which the wearer's toe sinks at every step. It is difficult to walk on snow-shoes, and to attain skill requires much practice. The shoe is not lifted as in ordinary walking, but rather slipped over the snow. Skilled snow-shoers, however, walk with as much ease over deep drifts of soft snow as on hard ground, the basket-work bearing the weight of a man in places where without it he would sink out of sight. Experts raise the shoe a little with the toe at the beginning of the step, letting the end trail, keep head and shoulders erect, and glide the shoes one over the other. Beginners are apt to catch the toe of one shoe under the edge of the other, and so trip themselves up. The Norwegian snow-skates, or *skier*, which are half skate and half snow-shoe, are described in the article on SKATING.

SOAP, Experiments with. Soap is described in C. C. T. 1. To make hard soap as an amusement, a few ounces of castor-oil and half a dozen sticks of caustic soda are needed. The caustic soda should be handled very little and kept in a tightly-corked bottle. Dissolve half an ounce of the soda in a gill of soft water, and pour into it an equal volume of the oil; on stirring, the mixture becomes turbid. Boil it gently for half an hour, then add about a gill of water, bring it again to the boiling point and put in a large teaspoonful of fine salt. After the

Snow-Shoe.

of a single light strip of hickory or ash, whose ends are bent until they meet, and then bound together for from 6 to 10 inches. Thin pieces of flat wood are fitted across this

mixture has cooled an hour or two the soap will be found collected in a layer at the top, from which it is easily removed. To make soft-soap caustic potash must be used instead of caustic soda.

2. Dissolve shavings of castile-soap, or any pure white soap, in boiling water, and add to part of it a teaspoonful of sulphuric or hydrochloric acid, diluted with considerable water. A greasy white substance rises to the top. This is stearine, which is often used in making candles.

3. To another part of the soap solution made in experiment 2 add some lime-water. The mixture becomes white and nearly solid after a time. This is because "lime soap" is formed, which water will not dissolve. It is this which is formed when soap is used with hard water.

SOAP BUBBLES, bubbles made by blowing into a film of soap solution. The solution may be made by dissolving any kind of soap in warm water, but better bubbles will be made if glycerine be added. One of the best solutions for making bubbles is formed after the following recipe :

Into a pint bottle half filled with distilled or rain water, put one ounce of white castile-soap shavings. Shake the bottle till the soap dissolves, and if it will not do so add more water. Then add one gill of glycerine, shake, and allow to settle.

The bowl of a common clay tobacco-pipe is dipped into the liquid so that the rim just touches the surface, till on raising it a film is stretched across the bowl. By blowing carefully into the stem of the pipe the film will stretch out into a bubble and then by a quick jerk of the pipe to one side the bubble will be detached and will float away, its elasticity closing at once the hole by which the air entered it. If it is strong it will bound on the floor or table, and can be rolled along by blowing it with the breath. Finally,

evaporation makes it very thin and it bursts into spray. If the solution is not strong enough, the bubbles are weak, and burst before they are fully blown. The better the solution, the larger the bubbles can be made, but it is better to begin by making small ones, and gradually increasing their size. After the bubble has been blown, the end of the pipe should be closed with the finger, for the bubble is elastic and tends to grow smaller, driving out again the air that was blown into it. Too much of the liquid, or a mass of froth, must not be taken up with the pipe, as it collects at the bottom of the bubble and often breaks it by its weight. Such a collection of froth may often be removed by touching it with the finger.

Gas Bubbles. By fitting one end of a piece of rubber tubing over a gas-burner, and the other over the end of a clay pipe, bubbles can be blown after a little practice, by turning on the gas little by little. As the gas is lighter than air, these bubbles will rise to the ceiling, and if a lighted match be touched to them, they will burn in the air. Still lighter bubbles can be made by blowing them with HYDROGEN.

Bubbles blown with a mixture of OXYGEN and HYDROGEN gases explode in the air with a loud report when they are lighted, but this mixture is dangerous, and should be used only by an experienced person.

Soap Bubble Parties, entertainments at which the blowing of soap bubbles is the chief feature. Prizes are usually offered, which are awarded in various ways. Each person may be allowed a certain number of trials, and he who blows and detaches the greatest number of bubbles may be declared winner. Or each one may blow till he makes a certain number of bubbles, and he whose bubbles last longest may receive the prize. Or each may be required to roll his bubble across the table by breathing on it.

Sometimes two goal-posts or pegs about six inches long and three or four inches apart are placed at the end of the table, and the bubble must be blown so as to roll between them. The sport may thus be varied in many ways. Care should be taken to test the liquid, which should be in good condition before the blowing begins.

Experiments with Bubbles. 1. A huge soap bubble can be blown by covering the hands well with suds and then holding them so as to form a cup, as in drinking from the hands, but leaving a small hole at the bottom. The mouth is then held about a foot from the hands and a current of air is blown into them. Bubbles a foot or more in diameter can be blown in this way.

2. Soap bubbles can be made to carry little figures cut from tissue-paper. One of these figures is attached by thread to a disk of paper D about as large as one's finger-nail, by passing the thread F through the paper and knotting it (Fig. 1). When the bubble is blown, and before it is detached, the thread is taken between thumb and finger and the disk applied to the side of the bubble (Fig. 2). If properly done it will glide down to the lower part, where it will stick. The bubble can then be detached, and it will float away, bearing the figure with it. The bubble should be blown with a glass tube, so that a very little shake will detach it.

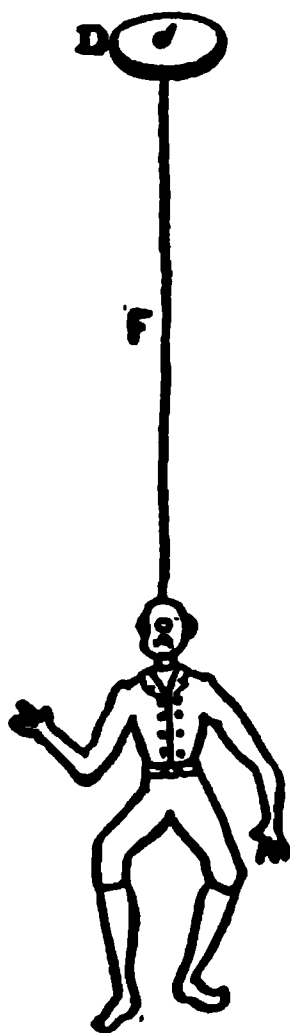


Fig. 1.

3. Bubbles blown from melted rosin in the same way as soap-bubbles, retain their form for many

months, and possess a silvery lustre which makes them very beautiful.

4. Pour some ether into a wide-mouthed jar and then drop a soap bubble into the jar, where it will float on the heavy vapor of the ether. (See also CARBONIC ACID.) Let it remain a few seconds and then remove it by pulling the jar down from under it. When a lighted match is touched to the bubble it will flash into flame. This is because some of the ether vapor has entered the bubble through the soap-film.

5. Blow two bubbles, and while they are hanging to the pipes try to make them join, placing the finger over the end of the pipe-stem so as to keep the bubbles the same size. No matter how forcibly they are pushed together, they will bound from each other as if made of India-rubber, and will not join. But if an electrified body be brought near them they will unite at once into a single bubble.

6. The colors on a soap bubble may be thrown on a screen by placing a lens in the path of a sunbeam from a HELIOSTAT and holding the bubble just beyond the focus of the lens, where the rays begin to spread apart. The colors will be thrown on the walls and ceiling of the room, and very beautiful changes of tint will be seen as the walls of the bubble grow thinner.

7. Make a stand of a piece of wire like the tripod stands described under CHEMICAL EXPERIMENTS. With a little practice a bubble can be made to rest upon it and remain a long time. The bubble may be pierced with a pin or cut with a knife without breaking, so long as the pin or knife are perfectly clean, but if either have the smallest particle of grease on them the bubble will break at once.

The beautiful colors of soap bubbles are due to what is called the interference of light, caused by the

thinness of their walls. The same colors can be seen in any very thin,

touch it to the soap-water, lifting off a film which stretches across the circle. Place carefully on this film of silk thread, which wetted with the soap, the film inside this thread will be stretched a circle by the elasticities of it.

For any game played by the oldest solitaire or is played on a circular board in which are either 37 or 33 holes arranged as in the figures. The form with 33 holes, which is now generally used, is the same that is used for playing FOX AND GESE. In the second figure it is arranged also for the form of Fox and Geese

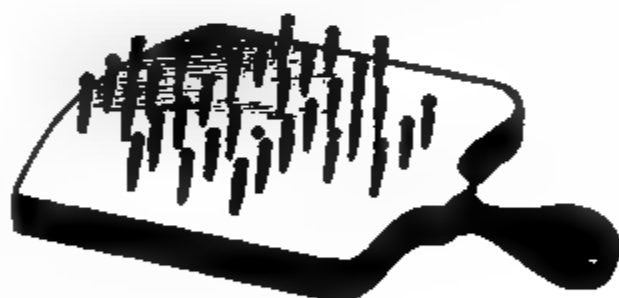
Fig. 2.

transparent substance, like a sheet of mica, or a film of oil floating on the water. The color is different as the thickness varies, and scientists have thus been able to measure the latter. Probably the most skilful soap-bubble blower living is Mr. C. Vernon Boys, an English scientist, who has performed many interesting experiments with bubbles. Among other things he is able to blow one bubble inside another.

SOAP FILMS, Experiments with. The bubbles made of soap film are described under SOAP BUBBLES. The following experiments can be tried with the soap-water used in making bubbles: 1. Dip the large end of a glass funnel into the water. The film formed will run into the funnel. This is because it is so elastic that it shrinks to as small a size as possible. If a bubble be blown at the large end, and the neck left open, the bubble will shrink, driving out the air within it. A skilful operator can blow out a candle by the air thus expelled.

2. Make a circle of wire, and

called the Battle Game. In each of these holes is a peg, though some



Solitaire Boards.

boards are made with depressions, instead of holes, in which marbles are placed. One peg or marble being taken out by the player, a peg two holes distant from the vacant spot is placed in it, and the

peg over which it jumps is taken from the board, like a captured man in CHECKERS. Another peg is jumped into one of the two vacant holes now on the board, and this is kept up as long as possible, a peg being taken from the board at each move. The player's object is either to remove all but one of the pegs from the board or to leave those that remain at the end in some given arrangement.

The marbles may thus be removed from the board in several ways, no matter what marble is taken at the beginning. Suppose the holes in the modern board to be numbered in vertical rows and lettered in the horizontal rows as below:

		C 1	D 1	E 1		
		C 2	D 2	E 2		
A 1	B 1	C 3	D 3	E 3	F 1	G 1
A 2	B 2	C 4	D 4	E 4	F 2	G 2
A 3	B 3	C 5	D 5	E 5	F 3	G 3
		C 6	D 6	E 6		
		C 7	D 7	E 7		

There are only seven different cases, and a solution of each is given below.

The direction C 4 to C 2, for instance, means that the marble in C 4 is to be placed in the empty hole C 2 and the marble between them removed from the board.

1. Remove D 4

D 2	to	D 4	C 2	to	C 4
F 1	"	D 3	A 1	"	C 3
E 1	"	E 3	D 3	"	B 1
E 4	"	E 2	A 3	"	A 1
C 1	"	E 1	A 1	"	C 3
E 1	"	E 3	D 5	"	D 3
E 6	"	E 4	D 3	"	B 1
G 3	"	E 5	B 1	"	B 3
D 5	"	F 3	B 3	"	D 5
G 1	"	G 3	D 5	"	F 3
G 3	"	E 5	F 2	"	D 4
B 3	"	D 5	C 4	"	E 4
C 7	"	C 5	E 3	"	E 5
C 4	"	C 6	F 3	"	D 5
E 7	"	C 7	D 6	"	D 4
C 7	"	C 5			

2. Remove A 2. (By changing the numbers this solution is good for the middle ball of any outside row.)

C 4	to	A 2
C 2	"	C 4
D 4	"	B 2
E 2	"	C 2
D 6	"	D 4
D 4	"	D 2
D 1	"	D 3
E 4	"	E 2
E 1	"	E 3
G 2	"	E 4
E 4	"	E 2
G 1	"	E 3
E 2	"	E 4
F 3	"	D 5
E 7	"	E 5
D 5	"	F 3

3. Remove D 3. (This applies also to E 4, D 5, and C 4.)

F 1	to	D 3	C 4	to	C 2
F 3	"	F 1	C 1	"	C 3
G 1	"	E 3	C 6	"	C 4
G 3	"	G 1	C 4	"	C 2
D 3	"	F 1	A 2	"	C 4
G 1	"	E 3	E 5	"	C 5
D 5	"	F 3	C 5	"	C 3
E 7	"	E 5	E 3	"	E 5
F 3	"	D 5	C 2	"	C 4
C 5	"	E 5	D 1	"	D 3
D 7	"	D 5	E 1	"	E 3
C 7	"	C 5	D 3	"	F 1
C 4	"	C 6	C 4	"	E 4
A 3	"	C 5	E 5	"	E 3
C 2	"	C 4	F 1	"	D 3
A 1	"	C 3			

4. Remove D 6. (This solution applies also to B 2, D 2, and F 2.)

D 4	to	D 6	C 6	to	C 4
F 3	"	D 5	A 3	"	C 5
E 7	"	E 5	A 1	"	A 3
C 7	"	E 7	D 5	"	B 3
E 4	"	E 6	A 3	"	C 5
E 7	"	E 5	C 4	"	C 6
G 1	"	E 4	C 6	"	E 6
G 3	"	E 3	E 4	"	E 2
D 3	"	F 1	E 2	"	C 2
G 1	"	E 3	C 2	"	C 4
B 1	"	D 3	E 6	"	E 4
C 1	"	C 3	B 2	"	D 4
E 1	"	C 1	D 3	"	D 5
C 4	"	C 2	F 2	"	D 4
C 1	"	C 3	D 4	"	D 6

5. Remove C 1. (This applies also to each of the seven other corner marbles.)

C 3	to	C 1	C 6	to	E 6
A 1	"	C 3	E 7	"	E 5
D 3	"	B 1	E 4	"	E 6
A 3	"	A 1	C 7	"	E 7
A 1	"	C 3	E 7	"	E 5
B 3	"	B 1	F 3	"	D 5
B 1	"	D 3	C 4	"	E 4
E 2	"	C 2	C 5	"	E 5
C 1	"	C 3	E 5	"	E 3
E 4	"	E 2	E 2	"	E 4
E 1	"	E 3	G 1	"	E 3
G 2	"	E 4	E 4	"	E 2
E 4	"	E 2	C 3	"	E 3
E 6	"	E 4	E 3	"	E 1
G 3	"	E 5	E 1	"	C 1
D 5	"	F 3			

6. Remove C 2. (This applies also to C 6, E 2, E 6, B 1, B 3, F 1, and F 3.)

C 4	to	C 2	E 7	to	E 5
C 1	"	C 3	F 3	"	D 5
A 2	"	C 4	C 6	"	E 6
C 4	"	C 2	C 7	"	E 7
E 1	"	C 1	E 7	"	E 5
C 1	"	C 3	C 4	"	C 6
E 2	"	C 2	E 4	"	C 4
C 2	"	C 4	C 3	"	C 5
A 1	"	C 3	C 6	"	C 4
E 4	"	E 2	E 5	"	C 5
G 1	"	E 3	C 4	"	C 6
E 2	"	E 4	A 3	"	C 5
F 3	"	F 1	C 6	"	C 4
G 3	"	G 1	E 3	"	C 3
G 1	"	E 3	C 4	"	C 2
D 5	"	F 3			

7. Remove C 5. (This also applies to C 3, E 3, or E 5.)

E 5	to	C 5	E 2	to	C 2
E 3	"	E 5	C 1	"	C 3
D 3	"	D 5	D 3	"	B 1
E 6	"	E 4	B 3	"	D 5
C 5	"	E 5	B 1	"	B 3
E 4	"	E 6	A 3	"	C 5
C 3	"	C 5	A 1	"	A 3
G 1	"	E 3	D 3	"	B 3
E 2	"	E 4	A 3	"	C 5
G 3	"	G 1	C 6	"	C 4
F 3	"	F 1	E 6	"	C 6
G 1	"	G 3	C 7	"	C 5
E 4	"	E 2	C 4	"	C 6
C 1	"	C 3	E 7	"	C 7
B 1	"	D 3	C 7	"	C 5
C 3	"	C 1			

The form of solitaire board with 37 holes is now seldom seen, so but one method of removing the pegs is given. The notation is like that above, save that the B and F columns have each five holes instead of three.

Remove C 1

E 1	to	C 1	C 4	to	C 6
D 3	"	D 1	C 6	"	E 6
E 3	"	E 1	F 5	"	D 6
G 1	"	E 3	E 4	"	E 6
B 1	"	D 2	E 7	"	E 5
C 4	"	C 2	C 2	"	C 4
C 1	"	C 3	C 4	"	E 4
C 6	"	C 4	E 4	"	E 6
C 4	"	C 2	E 6	"	C 6
E 4	"	E 2	D 1	"	D 3
E 1	"	E 3	F 1	"	D 2
E 6	"	E 4	D 2	"	D 4
E 4	"	E 2	D 4	"	D 6
A 1	"	C 3	D 7	"	D 5
A 2	"	C 4	B 5	"	D 6
A 3	"	C 5	D 5	"	D 7
G 2	"	E 4	C 7	"	E 7
G 3	"	E 5			

This game of Solitaire was fashionable in France about 1700, and some writers say that it was invented by a prisoner in the Bastille for his amusement. Others say that it was suggested to a Frenchman in America by the way in which the Indians stuck their arrows in the quiver when they returned from hunting. Others still derive it from the Magic squares early in use in the East. Leibnitz, the great German mathematician, was very fond of the game, and said of it: "It is good to play reasoning games, not for themselves, but because they aid in perfecting the art of thinking."

In England the name is sometimes translated, and it is called "The Solitary Game." In eastern Switzerland it is known as *Rathhausabheben* (City-hall Lifting), or *In das Nagelloch Springen* (Jumping into the Peg-hole).

Solitaire with Cards, or Patience. In these games the player's object

is to arrange the cards in some particular order, generally in what are called "families," a family being the whole series from Ace to King, whether of one suit or not. Families may be formed by piling or "building" upward, that is, by always placing a higher card on the one next below it, or downward, in the opposite way. The pack or packs, sometimes with the exception of certain cards which are laid face upward on the table, is first shuffled. The cards are then held in the player's hand, backs upward, and played one by one, always turning them face upward. In building, cards are sometimes taken from the pack in this way, sometimes from an arrangement of card piles on the table, and sometimes from either. The player is generally allowed to place any top card of these piles on any other just above or below it in rank, freeing the cards underneath that they may be used in building. This is sometimes called "making marriages." Cards that cannot be used are placed aside to form what is called stock, and this stock may generally be shuffled and used over again once or twice.

The arrangements of cards in these games are often given fanciful names, and success depends sometimes on the skill of the player, and sometimes entirely on chance. The different games of card Solitaire or Patience are described in separate articles in this book.

In some countries games of Patience are used as fortune-tellers, the player supposing that some project will turn out well or ill according as he is successful or not in his game.

SOUND FIGURES, Experiments on.
1. Buy at a hardware store a piece of sheet-brass one-eighth of an inch thick and six inches square. If it is not perfectly flat, have it hammered flat. Have the sheet cut into a circle and rounded off at the edges, and have a hole three six-

teenths of an inch in diameter cut in the centre. If the disk has been hammered it must now be heated red-hot in a stove and cooled slowly. From a broom-handle cut off a piece six inches long and fix one end firmly in a heavy block of wood. Round off the edges of the other end and then screw the brass disk to it. By drawing a violin-bow over the edge of the disk a sound may be produced. This should be practised till the note is clear and strong. Sprinkle sand on the disk and it will dance about while the note is sounding. This is because the disk is vibrating.

Now touch the edge of the disk with the finger, and draw the bow at a place one eighth of the distance around the disk. The sand will gather into two lines at right angles, one of which starts from the finger. The reason is that the disk now vibrates in parts, one part moving up while another is moving down, and the lines between these parts have no motion; hence the sand settles on them. By drawing the bow at different distances from the finger, or by touching the disk in more than one place, while some one else draws the bow, many other sand-figures can be made, some of which are shown in the illustrations,

Fig. 1.

If lycopodium powder (which can be bought of a druggist) be mixed

with the sand, it will form curious little heaps and whirlpools while the disk vibrates. Instead of being round, the sheet of brass may be square, as in Fig. 1, which shows a form mounted on a standard, to be bought of any dealer in physical apparatus.

2. Make a cardboard cone about ten inches long, two and one half inches in diameter at its larger end, and small enough at the other to fit into a rubber tube about two feet long. While one person is making the disk vibrate, let another hold the large opening of the cone over various parts of it, at the same time applying the end of the rubber tube to the ear. When the middle of the cone is exactly over one of the sand-lines, scarcely any sound at all will be heard, and the nearer the cone is to a sand-line, the weaker the

sound will be. This is because, as stated above, the disk does not vibrate at the sand-lines, and the parts of the disk on opposite sides of any line are always moving in opposite directions, one going up while the other is going down. Hence their effects on the air in the cone balance, and there is no sound there.

Instead of a brass plate, one of glass may be used in these experiments. It should be six or eight inches square, and should have its sharp edges smoothed down with a file moistened with turpentine. It

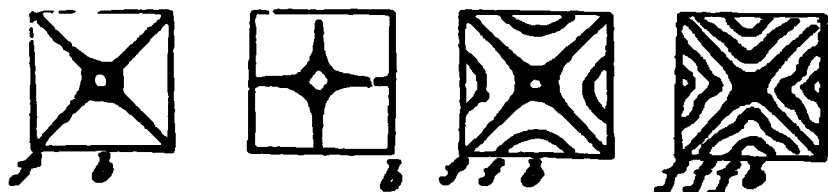


Fig. 2.

may be supported at the centre on an ordinary spool by pressing it

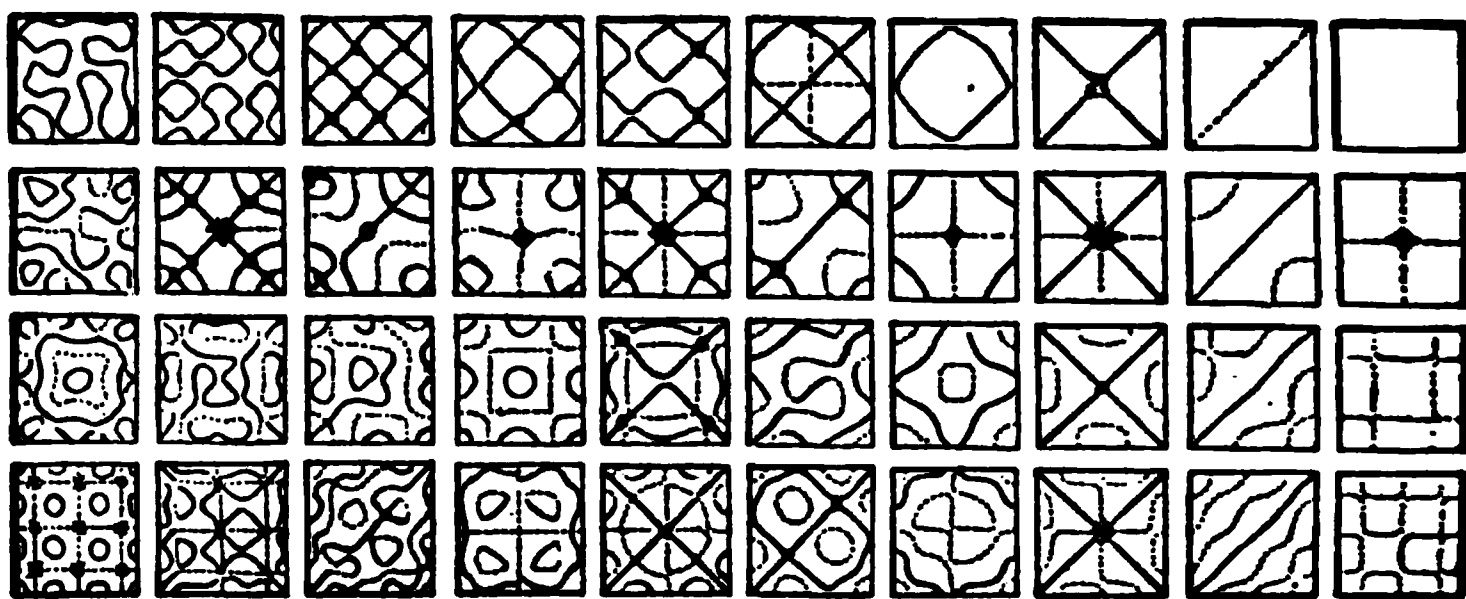


Fig. 3.

down firmly with the thumb, just over the spool. Figs. 2 and 3 show a variety of sound figures. In Fig. 2 the position of the bow is marked *b*, and that of the finger *f*.

The figures can also be produced without a bow in the following manner: In a flat lump of lead fix a piece of lead-pencil about an inch long, having on its end a common rubber eraser. This serves as a standard. To the central point of a common window-pane, attach by

sealing-wax a glass tube three sixteenths of an inch in diameter and twenty inches long. Place the plate on the standard, so that the end of the tube is just over the rubber eraser. Holding the upper end of the tube in one hand, rub it gently up and down with the moistened thumb and forefinger of the other. The tube is thus thrown into vibration, and causes the pane to vibrate also. Sand strewn on the glass will assume figures similar to those ob-

tained by the other methods. In this experiment the plate is caused to vibrate from the centre instead of from the edge.

SPATTER-WORK. Procure a box three inches deep, and as large as desired. Remove the bottom and top, and tack wire netting (which can be bought at a hardware store) over the top. The edges of the bottom must be covered with cloth, so that the box will not injure whatever it stands on. On the paper which it is desired to decorate with spatter-work lay some leaves, a fern, a design cut out of paper, or anything flat, and then place the box over it. Dip an old nail-brush in ink and draw it across the wire netting. The ink will spatter through

Spatter-work.

in fine drops on the paper. When the work is as dark as desired, the leaves or paper design is removed, and its shape will be seen in white on the spattered background. If part of the leaves are removed before the spattering is finished, the design will be in two shades, white and gray. The veins of the leaves may be drawn afterward with pen and ink.

SPECULATION. I. A game of CARDS played by any number of persons with a full pack. At the beginning of the game, each player is given an equal number of counters, and each places on the table a number pre-

viously agreed upon to form the pool, the dealer usually being required to put in more than any of the others. Three cards are dealt to each, one at a time, and the last is turned as trump. The hands are placed face downward on the table, each in front of its owner. Beginning at the dealer's left, each player in order turns up his top card till some one turns a higher trump than the trump card. The owner of this higher trump may then offer to sell to the one bidding the highest number of counters for it, whose property it then becomes. The player on the new owner's left then begins to turn up again, and so on till a still higher trump appears, which may be sold as before. The dealer has the privilege of refusing to turn up any card till a higher card than the trump card appears, and of selling either the trump card or his whole hand. Any one turning up a five or knave of a lay suit pays one counter to the pool. When the cards have all been turned, the owner of the highest trump takes all the counters in the pool. When the game is played at evening parties, after a certain number of rounds the one having most counters is given a prize. If any player look at his hand or play out of turn, he forfeits his privilege of taking the pool, even if he have the highest trump.

II. Another game is played as follows: Two packs are used, one of which is all dealt to the players, one card at a time, and the other placed face downward before the dealer. Four or five cards are drawn from this pack without being looked at, and placed face downward by themselves, each with a different number of counters piled on it. The players may look at their hands and show them to each other. At a signal, they begin the game by bargaining with one another for any cards they wish, each buying from whom he pleases, at any price

agreed upon. This either goes on for a time previously agreed upon, or the dealer may be allowed to stop it when he likes. He then turns up the cards of the unseen pack, one by one, and the holders of the corresponding cards give them up. When all have been given up, the holders of the remaining cards (which of course correspond to those laid aside) take the counters that were piled on them. The game then begins again, and after a number of rounds previously agreed upon the player having the largest number of counters is usually given a prize.

In playing the game a player may choose to sell all his cards, hoping to make a large number of counters in this way, and giving up his chance for the prize cards, or he may prefer to buy as many cards as he can, hoping to get the prize cards in this way. The price of cards is generally small at the opening of a game and increases toward the end, hence it is often desirable to buy at first and then sell. Sometimes the dealer turns part of the unseen pack and then allows more bargaining. Sometimes a number of the cards are not called for, and he who has most remaining is given a prize. Sometimes the holders of the prize cards are given separate prizes instead of counters, and the game may be varied in many other ways, at the pleasure of the players.

III. A game played by any number of persons with cards, on some of which are written the names of stocks, and on others words that occur in those names. Thus on one card might be "Western Union Telegraph," or "Lake Shore," and on others "Western," or "Shore." The cards are distributed evenly, and each player piles his hand in front of him, backs up. Each, in order, turns a card, and the first to turn a "stock" card says, "I speculate on Western Union," or whatever it may be. The first one

after him that turns up a card bearing one of the words in the name of that stock takes all of the speculator's cards that have been turned over. So the game goes on till some one has all the cards, thus winning the game. When any one has turned over all in his pile he turns the whole pile back into its former position.

SPELLING-MATCH, a contest between two parties to see which contains the best spellers. A number of people may choose sides (see **CHOOSING SIDES**), or the match may be between two schools or societies. The numbers should be equal, unless otherwise agreed beforehand. Each side must have a leader or captain, and the opposing parties generally sit or stand in two rows opposite one another, the captains at the head. Some one, not on either side, selected for the purpose, now gives out a word to be spelled to each side alternately, first to the first player on one side, then to the first on the other, then to the second on the first side, and so on. When any one spells a word incorrectly, the same is given out again till it is spelled correctly; and if it is so spelled on the side which did not miss it at first, the captain of that side is allowed to choose any one of the opposite party, who must then take his place on the winning side. If the word is spelled correctly by a member of the side on which it was first missed, there is no choosing. The match goes on thus till one side has all the players. A captain cannot be chosen till he is the only one remaining on his side. Instead of being given out by an outsider, the words may be given out by the captains, each giving out to the players in the opposite party. When one party or the other has won the match, it is often ended by "spelling down." In this process words are given out in regular order, and those who miss sit down, until only one is

left, who is considered the victor. Sometimes there are no sides at all, and the spelling down constitutes the whole match. In this case prizes are often given to the players who sit down last. Sometimes, instead of passing the word to the next player when it is missed, the one who gives the words announces the correct spelling, and then gives out a different one. This is the fairest method in the case of words which can be spelled in only two ways, so that if one is wrong the other must be right. A good plan is to allow the one who misses the word first to decide whether or not it shall be given out again. Spelling-matches are not really means of finding out the best spellers, but they are often exciting sport. The fairest kind of spelling-match is one where the words are written by each contestant, all writing the same word at the same time. When all have finished, the words are spelled correctly by the leader, and each player scores one for every word he has written as it should be. The side with the highest score wins. The following rules give an idea of how a public spelling-match should be conducted. They may be modified or changed as desired.

RULES OF THE GAME.

1. The officers of the match shall consist of a leader and one or more judges.

2. The leader shall give out only such words as may be decided on before the match. For instance, he may be limited to words contained in a certain dictionary or spelling-book, or to words not obsolete, or to words of a certain number of syllables.

3. Any contestant is at liberty to demand that the leader pronounce the word again, or that he define it.

4. If the word given out be spelled correctly, the leader shall say "Right," and at once give out another word. If it be spelled in-

correctly, he shall say "Wrong," and either give out the same word again, or another one, as has been agreed before the contest. If he give out a different word, he shall first spell correctly the word missed. The speller may appeal to the judges either on the ground that he spelled the word correctly and was misunderstood by the leader, or that his way of spelling is allowable. In the first case the judges may take the opinion of other players, or decide on their own. In the second, they shall consult such books of reference as were agreed on before the contest, and if the spelling given is allowable it is adjudged correct. [The best plan is to select two or more dictionaries as standards; say Webster's and Worcester's, and allow any spelling given in either.]

5. No contestant shall be allowed more than one minute from the time when he understands the word, and if he delay longer than that time he shall be considered to have failed.

Pronouncing-Matches. The same rules apply to these as to spelling-matches, except that the leader spells the words and contestants pronounce them. Instead of spelling them, the leader may display them written or printed on placards, or lists of the words may be distributed to the contestants at the opening of the match.

SPHEROIDAL STATE, Experiments on the. 1. When warm water is dropped on an ordinarily hot stove it turns quickly to steam; but if the stove be red hot, the water forms itself into one or more little balls, and rolls about, taking a long time to evaporate. As a stove-top is flat, the water usually rolls off, so the experiment can be tried better by holding the bowl of a metal tablespoon in an alcohol flame till it is red hot and then dropping warm water into it. The handle must be inserted in the split end of a piece

of wood so that the hand will not be burned. Let the spoon cool, and when it has cooled enough the little ball of water will suddenly turn to steam. This state in water or any other liquid is called the spheroidal state, because the liquid takes the shape of a flattened ball or spheroid. The reason it does not dry up at once is, that the water is supported on a kind of cushion of steam so that it does not touch the metal at all.

2. Put into a cold silver spoon a drop of water in which sulphide of sodium has been dissolved. It will turn black, because sulphide of silver is formed. Now try the above experiment with a drop of such water, and the spoon will not be blackened till it has cooled down below red heat. This is because the liquid, when in the spheroidal state, did not touch the spoon at all.

SPHYGMOGRAPH, an arrangement for recording the beats of the

light so as to reflect a spot on the wall, and this spot moves with each beat of the pulse. The room should be darkened if possible, all light be-

Sphygmograph.—Fig. 2.

ing shut out save that which falls on the mirror. Another form, sometimes sold as a toy, is shown in Fig. 2.





The word sphygmograph is from the Greek *sphugmos*, the pulse, and *graphein*, to write.

SPOIL-FIVE, a game of cards played by two to ten persons with a full pack. The rank of the cards is peculiar. In the red suits it is as in WHIST, except that the Ace ranks below the Two. In the black suits the order is reversed below the Knave, the Ace coming next, and then the Two, Three, Four, and so on to the Ten, which is lowest. The Ace of Hearts is always a trump, and the order of the cards in the trump suit is Five, Knave, Ace of Hearts, Ace of trumps, King, Queen, and then as in common suits. The following table shows the order briefly :

Common Suits.

RED.	BLACK.
	
	



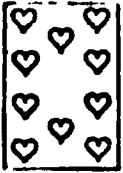
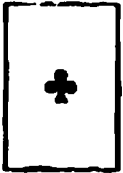
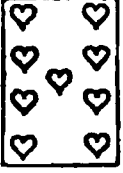
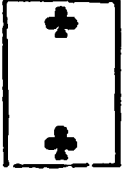
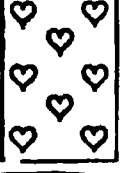
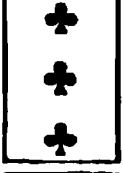
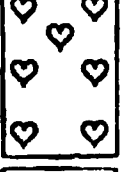
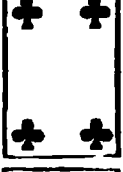
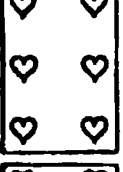
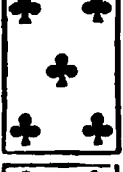
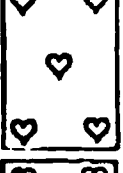
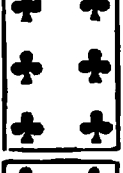
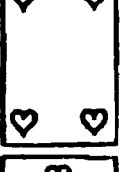
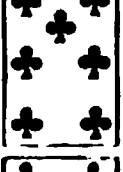
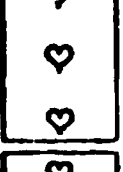
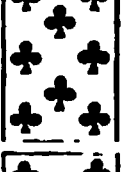
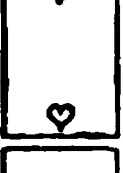
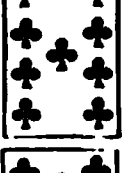

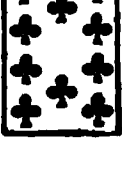
Trumps.

RED.	BLACK.
	
	


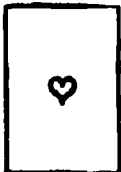







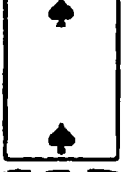
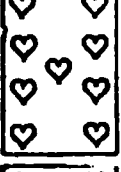
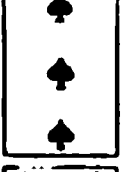

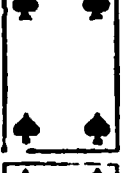
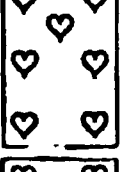
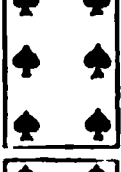
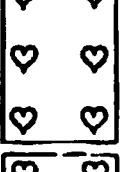
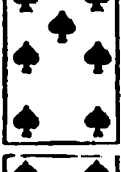
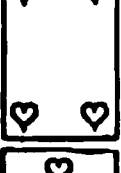

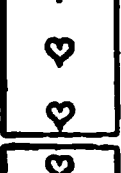


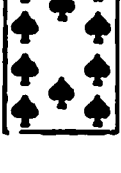
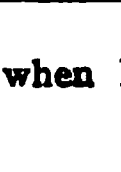
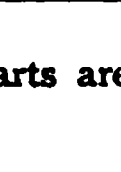


Sphygmograph.—Fig. 1.

pulse. A simple one can be made by fastening a bit of looking-glass to the wrist just above the pulse, with an elastic band, as in Fig. 1. The mirror is held in a beam of

Common Suits.

RED.	BLACK.
	
	
	
	
	
	
	
	
	
	
	

Trumps.

RED.	BLACK.
	
Ace of Trumps.*	
	
	
	
	
	
	
	
	
	
	
	
	
	

Five cards are dealt to each player, usually two and three at a time, as in EUCHRE, and the top card of the stock is turned as trump. When only two play, the non-dealer is often allowed to ask the dealer for another trump, and if the latter agrees the second card is turned. This is called "Fiving it." If the trump card is an Ace, the dealer has the privilege of "robbing," that is, he may discard any card he chooses, placing it face downward under the pack, and take the Ace into his hand. The dealer must rob, if at all, before the eldest hand plays. If any player holds the Ace of trumps in his hand, he *must* rob before he plays his first card. When a common suit is led, any player may trump, though able to follow suit; but if he hold no trump he must follow suit if possible. If a trump is led, suit must be followed, except that the Five of trumps, the Knave of trumps, and the Ace of Hearts need not be played when an inferior trump is led. This is called "reneging." Thus, if the Two of trumps is led and a player have no trump but the Knave, he need not follow suit; but if the Five had been led, he would be obliged to play the Knave. A player who takes three tricks in one hand wins the game, and playing ceases as soon as any one has taken three tricks. If no one wins, the game is said to be "spoilt." If the score is kept with counters, each contributes to the pool a number previously agreed upon, and the whole pool is taken by the winner. When the game is "spoilt," the pool remains, and each puts in more counters (usually half or a third of the original number). Sometimes every trick taken counts five, and he who gains a fixed number of points (usually 25 or 45) wins the game. When the game is 45, the trick won by the best trump out counts ten, unless some one has taken enough tricks to win the game before that trump is played. When

* Omitted, of course, when Hearts are trumps.

the game is scored thus, if any one take all five tricks he wins at once. This is called "Jinking it." Sometimes jinking is allowed also in the regular game. In that case, when a player has taken three tricks he may continue to play. If he take all the tricks, he wins double the pool; but if not, he wins nothing at all.

In Spoil-Five it is considered best to lead the worst card and to reserve good cards till the third trick. A non-leader should trump, if he holds only one trump (unless it can renege), but two trumps should be reserved.

Unless a player has a very strong hand, he should try to "spoil" the game, and to this end should allow no one to get more than one trick, if possible. When only two play, it is, of course impossible to "spoil" the game.

RULES OF THE GAME.

1. The deal is determined according to agreement either by dealing the cards one at a time, in which case he who receives the first Knave deals, or by cutting, in which case lowest deals.

2. If there is a misdeal, the deal passes to the left.

3. If a player deal out of turn he may be stopped before the trump is turned. If he is not so stopped, the deal is good, and passes to his left as if he had dealt in turn.

4. If a player neglect to rob before he plays to the first trick, he loses the right to rob, and can win nothing that hand.

5. If a player rob when he is not entitled to do so, or leads or plays wrongly, or reneges when he is not entitled, he cannot win in that hand. (This is called "hanging" the hand.)

SPOONS. See **BLIND MAN'S BUFF.**

SPORTS WITH FLOWERS AND FRUIT. A variety of sports and customs are connected with flowers and leaves, most of them observed only by young children. By plucking the

petals of the daisy or any similar flower, they pretend, in play, that they can tell different things about their future lives. Thus the following rhyme is repeated, one word as each petal is plucked:

"Rich man, poor man, beggar man, thief,
Doctor, lawyer, Indian chief."

This is repeated over and over again, and the word spoken as the last petal is plucked is supposed to tell what the child's condition is to be if a boy, or if a girl, whom she is to marry. In the same way, to discover where he will live, he says, "Big house, little house, pigsty, barn;" to tell what his dress is to be, "Silk, satin, calico. rags," and to find what he is to ride in, "Coach, wagon, wheelbarrow, chaise." Flowers are asked questions in this way in many parts of the world. In Switzerland the list of occupations runs:

"Nobleman, beggar, farmer, soldier, student,
Emperor, king, gentleman."

In this country, instead of pulling petals, the verse is often repeated while touching the buttons of the coat or dress. In Italy the leaves are plucked from the branch of a tree in the same manner. In the same way young girls pretend to find out whether their sweethearts love them, saying:

"He loves me, he loves me not,"

or,

"A little, much, passionately, not at all."

To find out when they are to be married, they repeat, while plucking the petals,

"This year, next year, some time, never;"

Dandelions gone to seed are often called "dandelion clocks," and children amuse themselves by trying to see in how few puffs they can blow away every seed. The number of puffs required is supposed to tell the time of day. Sometimes, if all the seeds can be blown off in three puffs, it is considered a sign that the successful one will be married within a year, or that his mother

wants him. Dandelions are also used to make chains and curls. Chains are made by cutting off the head of the flower and pushing the small end of the stem into the large end, thus making a circular link; another link is fastened to it by putting the second stem through the first before it is closed, and so very long chains can be made. This way of making chains is very ancient, and gave rise to the German name *Kette-blume* (Chain-flower). Dandelion curls are made by splitting the stems into strips and putting them into water, when they curl up curiously. By splitting a stem part way, making some wide and some narrow strips, the form of the curls may be varied.

Violets are used in the following sport: Each of two boys holds one of the flowers by the end of the stem, and placing them so that the stems will touch at about their middles, gives a sudden jerk, so that the flowers will catch together. One of the flowers is almost certain to be pulled off the stem, and the uninjured one is the victor. Sometimes a violet with a strong stem will come off best in many such contests.

The Maglo Rose. Dust some finely powdered aniline red over a white rose, and then shake it off. Sprinkle the rose with cologne water and it will turn red. The reason is that the alcohol in the cologne dissolves the fine particles of aniline which remain on the rose, rendering their color visible.

Sports with Leaves. The leaves of the lilac, the "live forever," and some other plants and shrubs have a thin, light-colored skin on the under side, by scratching which with a pin a dark mark is made. These leaves can thus be used to write messages on and to play many kinds of writing-games. Leaves with long stems can be fastened together by pushing the stem of one through the other, as shown in the

illustration. In this way crowns, garlands, baskets, and other things may be made. Leaves with short

Leaf-chain.

stems may be used in like manner by pinning them with long thorns or pine-needles. A drinking cup can thus be made which will hold water long enough to carry it from a spring to the mouth.

Sports with Grass. An interesting game is played thus with grass: An even number of blades

(about ten is the best number) is selected by each player. The blades should be from six to twelve inches long. Each lays his blades side by side, and, sitting down, holds one end of the branch between his knees. He ties the free ends firmly together in pairs, and then, placing the knotted ends between his knees, ties the others in like manner. Each now examines his bunch of grass to see how it is tied together. Those who have tied their grass so as to form a perfect circle are winners. The next best arrangement is a circle of all the blades but two, the others forming a little circle by themselves. The next is a circle of all but four, these forming a separate circle, and so on. In any case two circles linked together are better than two entirely separate. There are thirty ways in which ten blades can be thus arranged, and the more blades are used the greater will be the number of arrangements. With ten blades there is a very slight chance of making a perfect circle. With four blades the possible results are only three; perfect circle, two circles linked, and two circles unlinked. The game is entirely one of chance, as no one is allowed to look at the knots on one end while tying the others. The game is often played as a SOLITAIRE. Sometimes the bunch of grass is given the name of a playfellow, and the player pretends that his success in tying it tells him how much that playfellow likes him. Another sport with grass is to place a blade between the thumbs and blow on it, which, if correctly done, makes a rough, screeching note. The thumbs are held so that there is a little crack between them, and the edges of the blade must be stretched exactly in the middle of this crack. The broader the blade, the lower the note, and a very high tone can be made by using a thin shred. The note can also be varied by bending the thumbs a little, thus

tightening and loosening the blade of grass.

Green, a game or custom prevalent among children in some parts of Georgia and South Carolina. One points the finger at any other with whom he is playing, or whom he may meet, saying, "Green." The one addressed must then produce a leaf, bit of grass, or the like from some part of his dress. Children hide leaves in their shoes and other unlikely places with the object of making their playmates think that the "green" has been forgotten. It is considered a disgrace not to be able to produce the green when it is called for, and sometimes a forfeit is required from the one so caught.

This game was probably brought to this country by French Huguenots. It was played long ago in France, and is still common in some parts of that country, where persons of all ages take part in it at certain seasons. The French expression "*Prendre sans verd*" (to catch any one without green), means to take by surprise, and is derived from this game. The custom is probably an old MAY-DAY game.

Sports with Nuts. The ancient Roman boys played with round nuts as we do with marbles. At the present day they are used in such simple games as ODD OR EVEN, and for carving into various shapes, particularly little baskets, a circle of the shell being left for a handle, and the meat cleaned out. The horse-chestnut is most used for this purpose, as its shell is thin and easily cut. Pretty baskets may be made also of filberts and hazelnuts, and even of cherry pits. Cherry pits too may be made into chains by cutting them with a sharp pen-knife into rings, which, when cut open at one side, may be opened enough to put another ring through.

Acorn cups can be used as play-dishes, and with a little trimming

with a knife may represent cups, saucers, or plates.

Pea-nuts may be used in playing a variety of games, some of which are described in the article on PEANUT SPREES.

Philopena, a game played by two persons with nuts, usually almonds. When a person finds one of these with two kernels in it, he may ask any one he chooses to eat a philopena with him. If the one asked consents, each eats one of the kernels, and whoever says the word "Philopena" first on meeting the other after the end of a certain time (usually after the day on which the philopena is eaten) is entitled to a present from the other.

A more common way of eating a philopena is called Give and Take. If either of the players takes any object whatever from the other's hands, the giver is entitled to say "Philopena" and receive a present. This arrangement goes into force as soon as the philopena is eaten. Constant watchfulness is required to avoid being caught, and the players use all sorts of tricks to throw each other off his guard. For instance, one may pass the other a plate at table, or hand him a book or other article to look at.

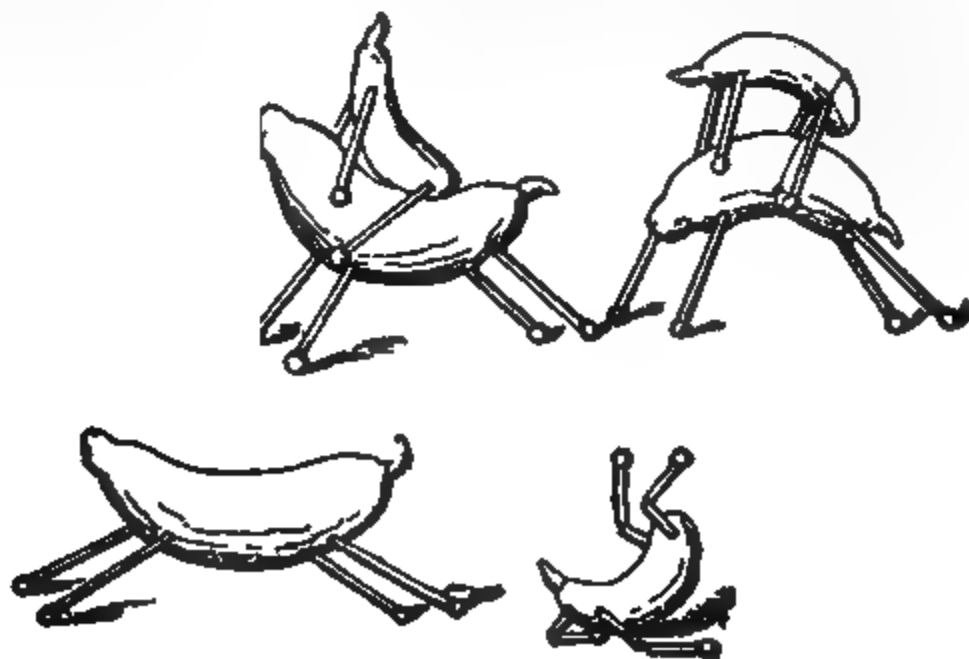
The Philopena is said to have originated in Germany, where it is called *Viel-liebchen* (much beloved), and some think that the first part of the word Philopena is a corruption of this name, the Latin word *pæna* (punishment) being added because the gift was thought to be a penalty. Others think that the first part is from the Greek *philos* (a friend).

Fruit Sports. Children eating apples give them names, and then count the seeds to decide their own fate. The following rhyme is recited while counting:

"One, I love; Two, I love;
Three, I love, I say;
Four, I love with all my heart,
And Five, I cast away.
Six, he loves; Seven, she loves;
Eight, both love;
Nine, he comes; Ten, he tarries;
Eleven, he courts; Twelve, he marries."

This rhyme is at least a century old, and probably much older.

To Make Designs on Growing Fruit. While the fruit is still green fasten on the side exposed to the sun letters or designs cut from tin-foil, or from thin sheet-wax, such as is used for making wax flowers. The foil or wax will prevent the sun from coloring the skin of the fruit underneath, and if it is removed



Cucumber Horses.

when the fruit is ripe the letters will be left in light green. Fruit of some other color than green when ripe should of course be chosen. Among the best for the purpose are rosy apples.

Cucumber Horses. The illustrations show how toy horses can be made from cucumbers and matches. Still more life-like ones can be made of crook-necked squashes.

Apple-skin Bird. Cut a thin slice from an apple (Figs. 1 and 2) and then pare the skin from it in one piece, leaving some of the apple adhering to it, and including a bit of the stem at the top, as shown in Fig. 3. Cut through all but the thin outer skin near the top of the strip (Fig. 4) and then, holding it between the thumb and finger just below the cut, pinch it slightly (Fig. 5). The effect of pinching is to

Apple-skin Bird.

move the top part backward and forward, like a bird pecking at something. If a piece of bread be held in one hand and the bird be made to peck at it, the resemblance at a little distance is quite striking.

Other sports with fruit, nuts, etc., are described in the article on HALLOWEEN.

SQUAILS. A game played by any number of persons, usually four or six, with disks of wood, like CHECKER men, called squails. The players, divided into two sides, sit alternately around a table with a smooth top, in the centre of which is a short metal column called the Process. Each player has two squails, which are numbered or colored to distinguish them from the others, and each in turn plays a squail toward the Process by placing it so that the edge projects from the table, and then striking it with the palm of the hand. The object is to get as near the Process as possible. The player may play his squail from any part of the table edge that he can reach with either hand while sitting in his chair. He may try to drive friendly squails nearer the Process, or knock those of the enemy away. Any played squail falling from the table, or going within three inches of the edge, is "dead" for that round. At the close of the two rounds the side which has the nearest squail to the Process scores one for each squail nearer than any of the enemies'. If a player knock the Process from the table, or within three inches of the edge, the opposing side scores two and the Process is replaced.

Cachinole. A kind of Squails placed on a circular board, in the centre of which is the Process. The squails are snapped with the fingers from the edge of the board.

Squails and Cachinole are practically the game of CURLING adapted to in-door playing. The principal difference between them and the similar out-door games is that the players shoot from all sides toward a centre, instead of from one end to the other of a rink or alley.

The natives of the Friendly and Samoan Islands, in the South Pacific Ocean, play a game like Squails, called *Laffo*, in which the players pitch beans upon a mat, trying to strike off those of the other players.

STAGE-COACH, a game in which all the players sit in a circle except one, who stands in the middle. Each of those sitting takes the name of some part of a stage-coach, of some article of dress of a passenger, or of something else connected with a stage ride. The one in the middle of the room then tells a story, bringing in these names as often as he pleases. Whenever he speaks the name a player has taken, that player must rise and turn around, or pay a FORFEIT. When the word "stage-coach" is spoken, all must rise and turn. The story ends with the words "the stage turned over," at which all change seats. In the confusion the story-teller tries to slip into a chair, and if he succeeds, the one left standing must take his place and tell a similar story. Of course there must be only chairs enough in the game for those sitting. If the story-teller gets a seat, he may take the name of the one left standing, or choose a new one. If he is unsuccessful, he must tell another story. This game may be varied in many ways: thus, the story may be about a sea voyage, and the players may be named after parts of a ship.

This game is similar to that of ECHO, where instead of turning at certain words the players repeat them after the story-teller. The Germans call it "*Die Reise nach Jerusalem*" (The Journey to Jerusalem), but it is entirely different from our "GOING TO JERUSALEM."

STARCH, Manufacture of. Starch may be made from flour as follows: Mix flour with enough water to make a stiff dough, and then knead or roll it between the fingers on a piece of muslin stretched over a bowl or dish, pouring on a little water every few seconds. The water that flows through the muslin carries with it a white matter, which gradually settles to the bottom and may be collected. This is starch. When all the starch has

thus been removed from the dough, a sticky mass remains, which is called gluten.

STATUARY. See LIVING STATUARY.

STEAM-WHEEL. A simple kind of steam-engine can be made as follows: Fasten the lid of a tin baking-powder box to the box with shellac varnish, and punch two holes in the side of the box, one about as large as a pin and the other as large as a slate-pencil. The latter must be fitted with a wooden plug. This box is the boiler of the engine. It must be glued between two upright posts fixed in a board, so that the pin-hole is on top. The upright posts rise about two inches above the boiler and bear, on an axle made of stiff iron wire, a wheel like a water-wheel, or the paddle-wheel of a steamboat. This can be made by taking a large pill-box, cutting slits in the sides, and drawing slips of pasteboard through the slits so that they project about half an inch. The slips are steadied by filling the box with damp sand before putting on the lid. This wheel is arranged so that one side is directly over the pin-hole. The boiler is now supplied with water through the plugged hole, and an alcohol lamp is placed under it. When the water begins to boil, the steam will issue from the pin-hole, and striking the paddles of the wheel, will spin it around very rapidly. If a grooved wooden wheel be glued to one side of the paddle-wheel, it may be connected by a string to one of the moving toys which are sold at toy-stores to be set in motion by miniature steam-engines.

ST. HELENA, a SOLITAIRE game of CARDS played with two packs. The four Kings of one pack are laid in a row on the table, and under them the four corresponding Aces. Cards are then placed, as they come, in a row above the Kings, and in another below the Aces; and then two cards are placed at the right of

the rows and two at the left. The whole pack is distributed in this order. The player's object is to build up families by suits, downward from the Kings and upward from the Aces, and whenever a card can be placed in its proper order it is so placed; but those that fall in the upper row can be used only on the Kings, and those in the lower row on the Aces. The side cards can be used on either row. After the pack has been distributed, the top card of any pile can be placed on any other top card just above or below it in rank; and when a card is thus uncovered that can be used in building, it is so used, bearing in mind the restriction noticed above. If it is necessary to pick up the outer rows, reshuffle them and relay them. It may be done once, and then any cards may be used in building, no matter on what row they fall. This game is said to have been played much by Napoleon in exile on the island of St. Helena, and this gives it its name.

STILL POND. See **BLIND MAN'S BUFF**.

STILTS, poles or crutches to raise the feet above the ground in walking. The stilts are held as shown in the picture. As usually made,

each stilt has a step of wood, on which a foot is placed; but some stilts have instead a loop or stirrup of leather, into which the foot is thrust. The latter kind is dangerous, for if the wearer trip or lose his balance and fall, the feet are apt to become entangled, whereas in the other case he can easily jump from the stilts to the ground.

Skilful walkers have their stilts strapped tightly to their legs, so that they

may use their hands freely. The art of walking on stilts depends on the principles of **BALANCING**, and is best learned by practice. The learner should mount at first from a stump or fence, high enough to step at once onto his stilts. It is impossible to stand still on stilts without the aid of a staff, for the ends of the poles do not offer so broad a support as the feet; but by taking little steps in one direction and another, the walker may remain near one spot as long as he pleases. It is easier to balance the body on long stilts than on short ones, for the same reason that it is easier to balance a long pole than a short one. In the Landes, a marshy tract of country near Bordeaux, France, the shepherds make great use of stilts (**C. T. T.**). In this and other regions where necessity has compelled the use of stilts, various stilt-games are played.

The illustration below, from an old manuscript, shows the use of stilts in ancient times.

Ancient Stilts.

STOCK EXCHANGE, THE, a game played by any number of persons, with a pack of cards. The players sit in a circle, and one of them, taking the cards in his hand, gives them

one by one to his left-hand neighbor, calling out the name of each card as he does so, three times in quick succession. His neighbor, as he receives them, hands them to the next player, calling out their names in like manner. The noise and confusion increases with each card handed out, and is supposed to resemble the sounds heard in the Stock Exchange, where the brokers are calling out the names of the stocks they wish to sell or buy. If the circle is not large enough for the whole pack to go around, the player at the right of the dealer holds the cards, as they reach him, instead of passing them. Thus the noise grows gradually less, and finally subsides when all the cards have gone around. Sometimes, when a Knave appears, instead of naming it the holder says H'm, H'm, H'm, thus imitating the undertone of conversation; and when an Ace is passed, the one who passes it cries Oh! Oh! Oh!

STOP. See NEWMARKET.

STRING-BALL, a game played by any number of persons with a hard rubber ball, suspended by a string from the limb of a tree or from a stick projecting from a window. The string should be from 10 to 15 feet long, and the ball should hang about three or four feet above the ground. One of the players strikes the ball with his hand, so that it swings, and those toward whom it moves try to catch it before it swings back past its lowest position. Should any one succeed, the striker is out and another takes his place; if not, he scores one point and strikes again, keeping on till he is put out. The order in which the players are to strike, and the number of turns each is to have, is decided at the beginning of the game.

Another method is for the striker to try to hit the ball so hard that the cord will be wound one or more times around the branch or stick to which it is fastened. Each has but

one trial at a time, and scores as many points as the cord makes turns around the branch. The cord is unwound after each trial so that the ball hangs as at first.

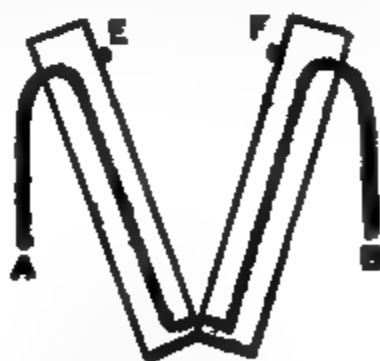
This is a German game, and its name is a translation of the German name *Schnurball*.

STRING-STICKS, an arrangement of sticks and string shown in the first figure. The string appears to

C

String-sticks.—Fig. 1.

pass directly through the top of the sticks, as it can be pulled back and forth by the ends A and B. A sharp knife can be passed down between the sticks at C, apparently cutting the string, yet it can be pulled back and forth as before. The second illustration shows the real arrange-



String-sticks.—Fig. 2.

ment of the string, which makes this possible. The string does not pass through EF at all, but down the sticks and through the hinge (D in Fig. 1).

SUGAR OF LEAD, Experiments with. Make a strong solution of sugar of lead, and add hydrochloric acid or a solution of common salt.

A fine precipitate of chloride of lead will be formed. Boil the solution and this will be dissolved, but on cooling it is deposited in beautiful crystals, sometimes called "The Silver Shower."

2. Repeat the above experiment, adding iodide of potassium to the solution of sugar of lead instead of hydrochloric acid. The crystals of iodide of lead formed on cooling are bright yellow, and the experiment is hence often called "The Golden Shower."

SULPHUR, Experiments with. Sulphur is described in C. C. T.

1. Place in a test-tube enough bits of stick sulphur, or flowers of sulphur, to half fill it. Heat the sulphur in an alcohol lamp flame and it will melt. At first it forms a light yellow liquid; but if it be heated more it turns dark, and becomes so thick that it will not run out even if the tube be held upside down. If it be heated still more, it becomes fluid again and finally boils, giving off a light yellow vapor. While it boils, pour half of it into a glass of cold water and set the rest away to cool. That which was poured into the water forms a dark mass like India-rubber, which does not resemble sulphur at all, and that which cools in the test tube forms long yellow crystals. The first is called *amorphous* sulphur, from two Greek words meaning "without form."

2. *To dissolve sulphur.* Sulphur will not dissolve in water or alcohol, but it will in carbon disulphide. If the solution be poured on a plate and dried, the sulphur will be deposited in crystals; but, as can be seen with a magnifying glass, these are not the same kind of crystals as those obtained by cooling in the first experiment, being shorter and blunter. The amorphous sulphur will not dissolve even in carbon disulphide.

3. *To bleach with sulphur.* Light a small piece of sulphur, and hold

over it some colored flowers in an inverted glass. The flowers will be turned white, either entirely or in spots. Dip the flowers in very weak sulphuric acid or ammonia, and the color will be partially restored. The bleaching is done by the gas called sulphur dioxide, which is made when sulphur is burned. More experiments with this gas are described in the article on it.

4. Mix seven grains of powdered sulphur with four grains of fine iron filings, and heat the mixture in an ignition tube. They will combine to form sulphide of iron.

SULPHUR DIOXIDE, Experiments with. Sulphur dioxide gas may be made by burning sulphur, as shown in Experiment 3 in the preceding article. It is hard to collect it when made thus, and it is also impure. A better way is to put two or three teaspoonfuls of small scraps of copper into a flask, cover them with strong sulphuric acid, and heat the mixture. The delivery-tube from the flask must lead to the bottom of a bottle where the gas will collect, as it is heavier than air. It will be perceived by the smell that the gas is the same as that produced by burning sulphur. The liquid remaining in the flask is colored blue with BLUE VITRIOL. By passing the delivery-tube into a bottle of water, the gas will dissolve, forming sulphurous acid, which may be used in bleaching, like the gas.

EXPERIMENTS.

1. *To turn sulphur dioxide gas to a liquid.* This can be done by applying cold or pressure, but the latter method is not safe without special apparatus. The first method is easy if care be taken. The delivery-tube first leads the gas into a bottle packed in ice, and it next passes through a drying bottle, and then through a U-tube packed in pounded ice and salt. The gas will condense into a heavy oily liquid at the bottom of the U-tube. If the

tube be one with a stop-cock at both ends, they may be turned, and the liquid can thus be kept any length of time. Otherwise it will evaporate again into the gas. The evaporation of the liquid produces great cold, as will be seen in the following experiments.

2 Put a little mercury in a watch-glass or butter plate, pour liquid sulphur dioxide over it, and blow a current of air across it with a bellows. The mercury will be frozen.

3. Pour some liquid sulphur dioxide on the bulb of an alcohol thermometer wrapped in cotton. It will sink very low. A mercury thermometer will not do so, because the mercury would be frozen.

4. Pour a quantity of the liquid sulphur dioxide into ice-cold water. Some of it will sink to the bottom. Stir this with a glass rod and it will boil at once, while some of the water will freeze.

SULPHURETTED HYDROGEN, Experiments with. (Read the article **CHEMICAL EXPERIMENTS.**) Sulphuretted hydrogen, also called hydrogen sulphide, is a gas composed of hydrogen and sulphur. It should be made out of doors or in an out-building, for it has a very bad odor, like that of rotten eggs. It can be made like **HYDROGEN**, using, instead of zinc, lumps of iron sulphide as large as the tip of the little finger. The gas can be collected over hot water, or led into a bottle of cold water, in which it will dissolve.

EXPERIMENTS.

1. All the experiments given under **HYDROGEN** can be repeated with sulphuretted hydrogen. When burned in a jar it will deposit a thin crust of sulphur on the inside.

2. Fill a bottle with chlorine and another with sulphuretted hydrogen and bring them mouth to mouth. Sulphur will be deposited. The same result will follow if chlorine

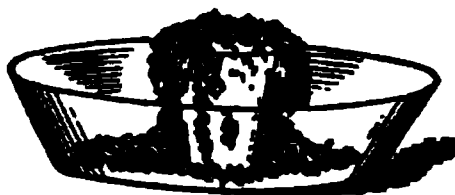
water and sulphuretted hydrogen water be mixed.

3. Hold a wet silver or copper coin in a stream of the gas or dip it in sulphuretted hydrogen water. The coin will be blackened.

4. Make a drawing or write a sentence on a piece of paper with sugar of lead dissolved in water. It will be invisible when dry. Dip it in sulphuretted hydrogen water, and the writing or drawing will show plainly in black. The reason is, that while sugar of lead is white, sulphide of lead (which is formed when it touches sulphuretted hydrogen) is black.

SULPHURIC ACID, Experiments with. Sulphuric acid is described in **C. C. T.** (Read also the article **CHEMICAL EXPERIMENTS.**) 1. Put a few teaspoonfuls of water into a glass, and on it slowly pour about twice as much sulphuric acid in a fine stream. Stir the liquid with a test-tube containing a little alcohol or ether. Enough heat will be developed to boil the liquid in the tube. Even water will boil in the tube, but not so readily.

2. Make a thick syrup by dissolving sugar in hot water. Put a few teaspoonfuls into a glass and pour sulphuric acid in it slowly, at the same time stirring it with a glass rod. The acid will turn the syrup into a mass of black spongy charcoal, as shown in the figure. If the



Experiment 2.

syrup is not thick enough, the mass will be half liquid.

3. Dip bits of wood into strong sulphuric acid. They will be charred as if by heat.

4. Dilute some sulphuric acid with about half its volume of water, and when it has become cold, dip into a piece of unglazed paper, let-

ting it stay about a quarter of a minute. Rinse the paper in water, then in very weak ammonia, and then in water again. The paper will be much tougher than before, being changed to a substance called vegetable parchment. The time it should remain in the acid varies with the kind of paper used, but by trying several times very tough parchment can be made.

SULTAN, a SOLITAIRE game of CARDS, played with two full packs. One Ace of Hearts and the eight Kings are removed from the pack and arranged on the table as follows: One King of Hearts (called the Sultan) is placed in the centre, with the Ace of Hearts just above him, and below him the other King of Hearts. On each side of the Ace are laid the Kings of Clubs, just below them the Kings of Diamonds, and below these the Kings of Spades, representing respectively War, the Treasury, and Industry. The back is now shuffled, held back upward, and playing begins. The first four cards are laid in order on one side of the figure already formed, with their ends toward the figure, and the next four on the other side in like manner. These eight cards are called the Sultan's Divan. The piles of suits are now to be completed in order, by placing on the Kings the Aces, Twos, Threes, and so on up to Queens, using cards from the pack, any card from the Divan, or the top card of the Stock, which consists of the cards that cannot be used, piled on one side. The Ace of Hearts is also built upon in like manner. When a place in the Divan is empty it must be filled at once, either by the next card played, or the top card of the Stock, as the player chooses. When the game is ended, it shows the Sultan surrounded by his eight Queens.

SUN-DIALS. The use of sundials and the form of one kind are described in the article CLOCK in C. C. T. There are many other

kinds, all of which can be constructed with a little care. One of the simplest consists of a circle or disk of metal, having its circumference divided into twenty-four equal parts, numbered from one to twelve twice over, as in Fig. 1. Zinc is

Fig. 1.

the best material for all the dials, as it does not rust and is easily marked and cut. In the centre is fixed a straight pin called a style, which must be exactly perpendicular to the disk. The accuracy of the dial depends on this, and on its being placed so that the style points in the same direction as the earth's axis. This may be brought about in two ways. In one, a little hole is made through the metal disk, close to the style, and then, on a clear night, the dial is so placed that by looking through this hole, the north star is brought into line with the style. In the other method a triangle is cut out of pasteboard (see Fig. 2) having the

A angle C just equal to the latitude of the place. This can be done by finding the latitude on a map, and then making the angle with the aid of a



Fig. 2.

piece of metal marked off in degrees, called a protractor, which can be bought of any dealer in drawing materials. Fix this triangle, with the aid of a compass, so that the end B points due north and the base BC is horizontal. Then fix the dial so that the style points along the line AC, the free end being toward A. The figure 12 must be exactly below the style.

Globe-dial. A dial can be made of an ordinary school globe, mounted on an axis which points toward the north pole (see Fig. 3). The globe

Fig. 3.

is divided into twenty-four parts by meridians of longitude, which are numbered from 1 to 12 twice over, one six o'clock meridian being exactly on top of the globe, and the other at the bottom. There is no style, the hour being pointed out by the line between the light and dark part of the globe. As this is rather blurred, the dial is not very exact.

Trough-dial. This is formed of a semi-circular trough of tin or zinc closed at the end as shown in Fig. 4. Straight lines divide it lengthwise into twelve equal parts which are numbered from 6 A.M. to 6 P.M., the twelve o'clock line being at the bottom. Instead of a style a wire is stretched lengthwise across the

middle of the trough from end to end, whose shadow points out the

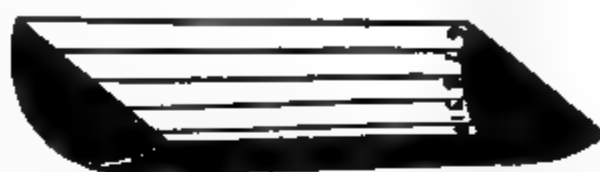


Fig. 4.

hours. The trough must be placed in a north and south direction.

Horizontal Dial. This is more common than the others just described, but is harder to make because the dial is not divided into equal parts. To make one exactly requires the use of mathematics, but one can be made roughly as follows: Fix a disk or square plate of zinc on a post, so that it will be perfectly level, and in the middle drive a pin for a style, inclined as before in the direction of the north star. The triangle in Fig. 2 may be cut out of zinc and soldered to the dial, its edge AC answering as a style. Watch the shadow of the style, and mark each hour on the edge of the dial where the shadow falls at that hour. Only the time used must be sun time—not true time. The difference between these two sorts of time will now be explained.

Correction. If the earth moved around the sun at a uniform speed, the sun dial would always indicate the true time, but it moves faster at some times than at others, so that a correction must usually be added to or subtracted from the hour it points out, and the same correction must be used in marking the hours on the dial. A table of these corrections (expressed in minutes) is given below. All corrections marked + are to be added to the reading of the dial to get the true time, and all marked — are to be subtracted. In marking the dial, where it is necessary to get sun time from true time, the corrections marked — are added to the

true time, and those marked + are subtracted. All the days of the month are not given, but the corrections for the omitted ones can easily be calculated. Thus, the correction for Jan. 5 is + $5\frac{1}{2}$, and that for Oct. 12. is - $13\frac{1}{2}$.

Jan.	25 | - 2	21 | - 7
	30 | - 3	24 | - 8
1 | + 4	May	27 | - 9
4 | + 5		30 | - 10
6 | + 6	1 | - 3	Oct.
8 | + 7	17 | - 4	
11 | + 8	28 | - 3	3 | - 11
13 | + 9	June	7 | - 12
16 | + 10		10 | - 13
19 | + 11	4 | - 2	14 | - 14
23 | + 12	10 | - 1	19 | - 15
27 | + 13	19 | + 1	27 | - 16
31 | + 14	24 | + 2	Nov.
Feb.	29 | + 3	
	July	10 | - 16
3 | + 14		17 | - 15
19 | + 14	4 | + 4	21 | - 14
26 | + 13	10 | + 5	25 | - 13
March	19 | + 6	28 | - 12
	Aug.	Dec.
3 | + 12	1 | + 6	1 | - 11
4 | + 11	11 | + 5	2 | - 10
12 | + 10	16 | + 4	6 | - 9
15 | + 9	21 | + 3	8 | - 8
19 | + 8	25 | + 2	10 | - 7
22 | + 7	29 | + 1	12 | - 6
25 | + 6	Sept.	14 | - 5
28 | + 5		16 | - 4
April	4 | - 1	18 | - 3
	7 | - 2	21 | - 2
1 | + 4	10 | - 3	23 | - 1
4 | + 3	13 | - 4	27 | + 1
8 | + 2	16 | - 5	29 | + 2
12 | + 1	18 | - 6	31 | + 3
19 | - 1		

SUN-SPOTS, Observations on.

The sun is described in C. C. T. The spots on it may be seen through an ordinary opera-glass, the eyes being protected from its rays as follows: Procure two strips of window-glass one inch wide and two inches long, and smoke one of them over a lamp or candle flame till the sun can be seen through it without hurting the eyes. Fasten the

pieces of glass together, smoked side inward, by elastic bands, keeping them apart by slips of paper pasted at the ends, so that the smoked side will not rub. The pieces of glass can now be fastened over the eye-pieces of the opera-glass by a large elastic band around the middle. The spots can now be seen easily. When a spot shaped so that it can be recognized is seen, it should be watched from day to day, and will be seen to change its place. The reason is that the sun is turning on its axis like the earth, carrying the spot around with it. The average number of sun-spots does not remain the same, but is greatest every eleven years. The last year when there was the largest number was 1881, and the next will therefore be in 1892. Until about that time there will be more and more of them, and then they will decrease in number till about 1897, when they will begin to increase again.

SWAYKA, a game played by any number of persons with an iron pin eight or nine inches long, and any number of iron rings varying in diameter from two inches to one foot. The pin, which is called the Swayka (its name in Russian), is so sharp that it will stick upright when thrown either at the ground or a board floor. The rings are placed in any order on the ground, and the players try to throw the Swayka so that it will stick upright within one of them. Their object is so to place it in each one of the rings in any order.

RULES.

1. The players take turns, each having only one throw in a turn.
2. A player may throw first at whichever ring he chooses, but he must announce beforehand which one it is, and if he throws the Swayka into any other it counts as a miss.
3. Whoever can place the Swayka in all the rings in regular order of

size, beginning with the smallest and ending with the largest, receives the name of King, has general control of the game, acts as umpire, and has the right to order any one to pick up the Swayka for him. When he reaches the largest he must begin at the smallest again, otherwise he cannot remain King. He holds the title as long as he can throw successfully in that order. If two or more players earn the right to be King they must throw together, the other players omitting their turns till all but one have missed.

4. No player may throw a second time at the same ring till he has placed the Swayka in all the other rings.

5. When a player misses, all the rings he has thrown into count for nothing, and he must throw, at his next turn, into the next larger ring. If he miss that, he must take the next larger at his following turn, and so on till he is successful or misses the largest ring.

6. Whoever misses the largest ring is out of the game, and is obliged to pick up the Swayka for his companions till some one else misses that ring and takes his place.

7. The game may last as long as desired. If so agreed, he who has been King the greatest number of times during the play is victor.

Swayka is a Russian game, and is said to be very popular in that country.

SWEDISH WHIST. See PREFERENCE.

SWIMMING, the art of propelling one's self through the water by the arms and legs.

Learning to Swim. The learner should choose, if possible, a gradually sloping shore with gravelly or sandy bottom, where there is no current. If he is not used to the water, he must first accustom himself to being under it by lying down on the bottom, where it is only one or two feet deep. He

will thus, after practice, be able to enter the water without gasping, and will learn that it is easy to keep his body afloat by a very slight push of the hand against the bottom, as shown in Fig. 1. He should try to

Fig. 1.

Fig. 1.

open his eyes under water, and when he puts his head out he must remember to breathe outward before inhaling, thus expelling the water from his nostrils. After he has acquired confidence, he should wade out to a depth of about four feet, and try to swim to shore, using the simple chest stroke, or swimming "dog-fashion," as explained below. At first he will probably splash about rather aimlessly with hands and feet; but as soon as he sees that he can keep himself afloat, he will be able to follow directions more exactly. When he sinks he can sustain himself by pushing with one hand against the bottom—but this should be done as seldom as possible. When he can swim a few strokes without this aid, he should begin at a greater distance from shore, and so on, until he is perfectly at home in the water. This will probably be only after much patient practice, though some learners make faster progress than others.

This is not the only way of learning to swim. Some people advise the learner to jump at once into water over his depth, trusting to his instinct and to his natural struggles to get to shore; but this should never be tried unless some older person is near to rescue the swimmer in case of need. Timid people should never try it at all. Another

method is for a teacher or companion to support the learner, by plac-

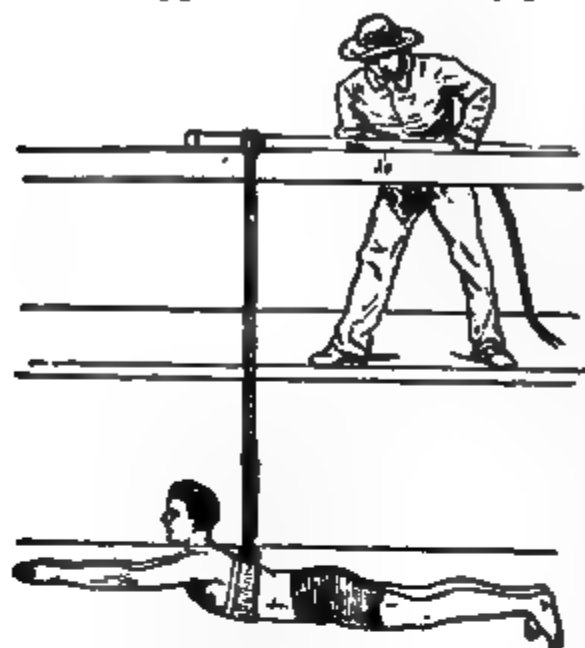


Fig. 2.

ing a hand beneath him till he has learned to make the proper motions

and is able to keep himself up. In another method a band around the learner's chest is fastened by a rope to the end of a pole held by an assistant (see Fig. 2), who thus gives the swimmer aid as long as he needs it. Some teachers say that the learner ought to practise his strokes lying across a chair, before he tries them in the water, but others consider this unnecessary. The various kinds of swimming strokes will now be described.

Breast-stroke. This is the ordinary stroke and the one generally used by learners. Fig. 3 shows the position of starting as seen from above, and Fig. 4 the attitude as seen from one side. The hands are brought under the chin, fingers together, and palms down and slightly hollowed. The arms are then pushed straight forward, keeping the hands together till they are at

German Swimming School.

full length. The hands are now separated and brought obliquely backward and downward (called "striking out") till the arms are in line with the shoulders, when the hands are brought in edgewise till they are together just beneath the chin, as at first. Some swimmers

take a longer stroke than this, bringing the hands down as far as the hips. While the hands are making

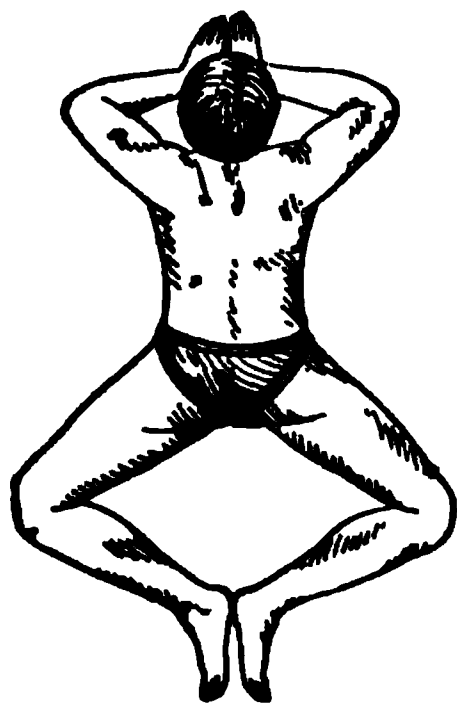


Fig. 3.

this stroke, the feet and legs make a corresponding one. The knees are bent so that they will be as far

apart as possible, while the feet are together, and the legs are then kicked back and out so that the soles of the feet press flatly against the water. The legs must then be closed stiffly, like a pair of scissors, forcing the water out from between them, and so pushing the swimmer forward. When they are closed the knees must be opened again as at first.

The arm and leg strokes must be made at the same time, the feet being drawn up as the hands are advanced, the kick being made quickly as the hands begin to strike out, and the legs being closed when the hands have about half finished the stroke. Fig. 4 shows the proper angle for the body to make with the water surface. The head should be kept back as far as possible, that it may be supported by the lungs. The breath should be in time with

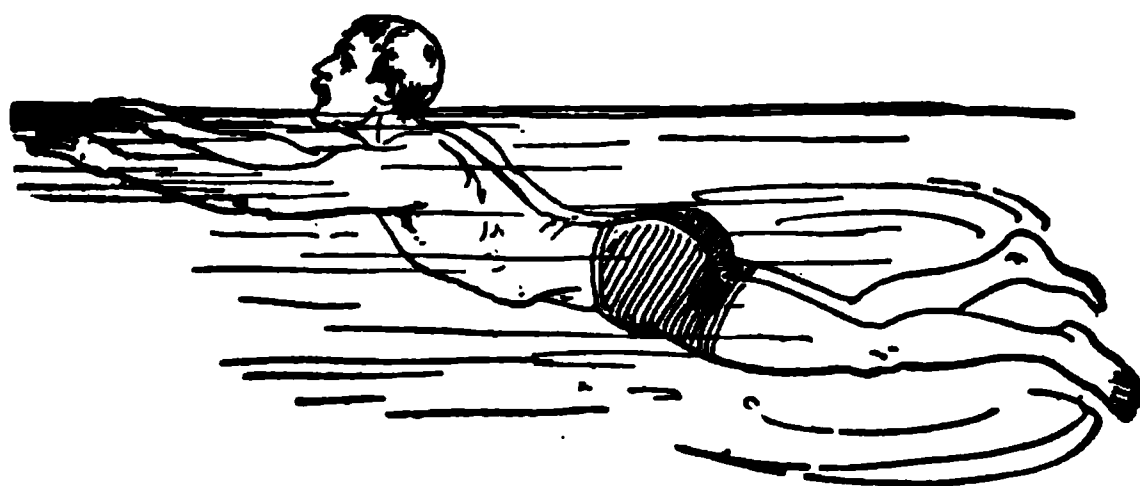


Fig. 4.

the stroke, the lungs being empty when it is being made, and full when the swimmer is drawing in his limbs for a new one. The reason for this is that the body is lighter when the lungs are full of air, and there is greatest need of their sustaining power between strokes.

Beginners are apt to place most reliance on the arm movement, paying little attention to the legs; but the leg stroke is really as important as that of the arms, or even more important, as some teachers think. The swimmer will be able to go much farther without tiring himself if he

uses his legs properly than if he simply kicks with them.

Side-stroke. The swimmer lies on his side instead of his breast. Either side may be used, but most swimmers prefer the right, since the right arm can then be used to the greatest advantage. The head is turned so that the chin rests against the uppermost shoulder, and lies as deeply in the water as possible. The face may be kept above water, or it may be above only when the forward impulse raises it a little. The lower hand is advanced under water on a level with the head, and

then is brought downward at arm's length. It is returned by bending the elbow and wrist, so as to give as little resistance as possible. While this hand is being advanced, as just described, the upper hand is used like an oar, the fingers being bent at right angles to the arm. Thus the hands are used alternately, each doing its work in turn. At the same time the upper leg is kicked out in front of the body, and brought around like an oar, the foot being stretched out in a line with the leg, and the lower leg is stretched out beyond the back, and brought around to meet the other. Both legs are then drawn in for another stroke, as in the chest-stroke. The side stroke requires more practice than the chest-stroke, but the body offers less resistance to the water in this stroke than in any other. It is often used by skilled swimmers as a rest in going long distances.

Overhand Side-stroke (Fig. 5). This is like the one just described, except that the uppermost arm is



Fig. 5.

advanced out of water instead of under it, as shown in the illustration.

Swimming Dog-fashion. The arms are moved alternately outward, downward, and then inward, with a pawing motion, but without leaving the water. The motion of the legs may be as in the chest-stroke, or they may be kicked backward alternately. This stroke is often used by beginners, and is the natural one for most people, though not the best for ordinary use.

Swimming Turtle-fashion (Fig. 6). Like the last stroke, except that the

arms are thrust forward alternately above water, the body turning from side to side. This stroke is swift,

Fig. 6.

but more tiresome than the chest-stroke.

Swimming on the Back. There are several methods. In one, the swimmer lies on his back, keeping his face barely out of water. The legs are inclined downward and held together, the stroke being made entirely with the hands. The arms are kept closely at the swimmer's sides and he propels himself by a rapid twisting motion of the hands from the wrist, the back of the hand being uppermost to begin with, and the palm at the end of the stroke. The chest stroke may also be used in swimming on the back. The swimmer may advance head first or feet first, as he chooses, and he may use hands alone or feet alone in making his stroke. When the arms are not used they should be folded on the chest, or held straight along the side.

There are many other methods of swimming, and every good swimmer usually has a stroke differing a little from every other. When one has mastered the simple strokes, he can invent other methods to suit his fancy. Some of the styles used by skilled swimmers, besides those already mentioned, are:

1. The corkscrew stroke, in which the body turns under water, apparently screwing its way forward. This is done by a patting motion of the soles of the feet, the swimmer steering with one hand, which is held straight forward.

2. Swimming with one hand or foot, or both feet, out of water. This is useful where a swimmer wishes to carry his clothes across a deep stream.

3. Swimming with hands and feet bound, or with one hand holding one foot.

Diving, entering deep water head-first by leaping. The water should be more than six feet deep, or the swimmer may injure himself by striking against the bottom. Various attitudes in diving are shown in the accompanying illustrations, but that commonly preferred is the

ing the water smoothly. When beneath the water he may strike out, keeping under as long as possible, and rising at a distance from the place where he entered, or he may rise at once, aiding himself by a



Diving Sideways.

Diving Forward.

one where the diver extends his hands above his head. Sometimes a spring-board is used to aid the leap. Before beginning to dive the swimmer should master the ordinary strokes, and should be able to keep his eyes open under water. He must leap so that he will enter the water head first, for if he strikes flat on his chest the shock is severe. When the dive is made properly there is no splash, the body enter-

ing the water smoothly. When beneath the water he may strike out, keeping under as long as possible, and rising at a distance from the place where he entered, or he may rise at once, aiding himself by a downward movement of the hands. The depth to which a diver goes depends on the angle at which he enters the water, and on his movements beneath it. Skilful divers often bring up stones from a depth of twelve or fifteen feet, while on the other hand they can dive without touching bottom when it is only six or eight feet below the surface. A very deep dive is often aided by carrying a stone in one hand. The learner may begin diving by standing in water up to his waist and plunging into it head first. He should try diving from a moderate height before he ventures to leap from a high bank or from a spring-board. Some swimmers dive feet foremost; but this requires skill to keep upright, if the jump is from a high place; and if the swimmer strikes on his side or does not hold his feet together, he may be badly

injured. Jumping into the water from a low bank, however, is perfectly safe, and requires no skill.

When a swimmer dives frequently, he should fill his ears with oiled cotton. People who have large nostrils are often obliged to stop them up in like manner, and boys, when diving, often hold the nose in one hand; but this is awkward and can only be done when diving from a very low bank, or from a row-boat.

Floating. The human body is a very little lighter than water, on an average, but the head is heavier than water. If left to itself, therefore, the body tends to float, but with back upward, the head hanging down beneath the surface. To float on one's back, keeping the mouth and nostrils out of water, so as to breathe, requires skill and confidence. The lightest part of the body is the lungs, and the swimmer's effort should be to alter the position of the limbs and body above and below the lungs, so that there will be a perfect balance. One of



Floating.

the best floating positions is that where the swimmer extends his arms above his head, throws the head back, and draws up the legs under the thighs. The body is not horizontal, but inclines downward toward the legs, the back being slightly hollowed. The only parts of the body above water are the chin, mouth, and nose. A more difficult position is the horizontal, the body being held straight and stiff, the legs close together. The toes, chest, face, and fingers are just above the surface. It is also possible to float perpendicularly. Confidence is more essential to floating than anything else. The beginner usually feels that he is going to sink,

and throws up his hands, with the result that he goes down, his body not being light enough to sustain his arms out of water. The learner should remember that his body will float of itself so long as it is nearly under water, and that there is no danger of his sinking unless he tries to raise head or limb. In assuming the floating position, all the movements must be made slowly and under water. The lightness of the body will be increased by keeping the lungs as full as possible. To one who is skilled in floating the sensation is delightful, and swimmers often rest themselves thus in still water. In rough water it is of course impossible.

Treading Water. To tread water the swimmer assumes an upright

Treading Water.

position, only the head being above water, and moves his legs as though walking upstairs, pushing downward against the water with the soles of his feet. Very slight exertion is required to keep the head

above water, but the swimmer must not try to keep it too high, remembering that when more of the body is above the surface, it is harder work to sustain it. Another method is to move both feet together, as in the chest-stroke—but this causes the body to rise and fall with each effort. In either method the arms may be held straight at the sides, or "akimbo," or folded across the chest.

Swimming in Rough Water. The swimmer should learn his strokes in still water, but when he has mastered them he should practise them also in rough water. He should try to go through the waves rather than over them. In the surf it is necessary to look out for the undertow, which is a strong current of water flowing outward from the shore underneath the waves which are rolling in. If the swimmer lets his legs drop too low, this current will strike them and pull him back. He should not, therefore, let them

hang at an angle with the surface, as ordinarily, but should swim with his whole body as near as possible on the top of the wave. The upper current will then help him get to shore.

Cramp. Swimmers are sometimes attacked in the water by cramp, a contraction of the muscles of the arm or leg, making it impossible to use the affected limb. Many swimmers have been drowned by an attack of this kind, yet there is no danger if one keep his presence of mind. The trouble can often be relieved by rubbing, changing position, or a powerful effort to straighten the cramped limb, but if not, the swimmer should float or paddle to the shore, or until aid arrives. The chief thing is not to lose courage, for the best swimmer, if he do this, is no better off than one who does not know how to swim at all.

Swimming Apparatus. Many devices have been invented to aid

Swimming Propeller.

swimmers (see illustration), but none are recommended for learners, except that some teachers advise their pupils to push a plank

before them while learning the use of the legs. Life preservers, or devices to keep the body afloat, are useful where it is necessary to keep

in the water a long time, or where a person who does not know how to swim is obliged to jump into the water; but they are a hindrance rather than an aid to real swimming. Those provided in steamboats and ships for use in case of accident are usually wide strips of

Captain Boyton's Suit.

cork or inflated rubber covered with canvas. Some are tied on close under the arms, and others are arranged to be put on like a waistcoat. Care must be taken that the preserver does not slip to the lower part of the body, for then the head will go down and the feet up. Other devices to aid swimmers consist of plates to be fastened to the hands and feet, but the most celebrated invention of this kind is the

inflated India-rubber suit of Captain Paul Boyton, shown in the illustration. By putting on this suit a man makes a boat of himself, and can paddle or sail, as he wishes, carrying provisions with him. In one of these suits Captain Boyton has performed many remarkable feats, such as crossing the English Channel on May 28, 1875, in twenty-four hours, descending the Danube, 460 miles, in six days, in May, 1876, and floating from Cedar Creek, Montana, to St. Louis, Mo., 3580 miles, which took him from September 17 to November 20, 1881.

General Advice. The swimmer should not stay too long in the water. Usually twenty minutes at a time is long enough. The head should be wet before going in, for as cold water drives the blood from the surface of the body as it touches it, there might be a rush of blood to the head if it were the last part of the body to enter the water.

It is wrong to bathe just after a meal. At least two hours should be allowed to pass after eating before entering the water.

It is a good plan for the swimmer to accustom himself to swim with his clothes on. This may be of great use in case of accident. He should also practise undressing, or at least removing his heavier garments, while in the water. Where it is necessary to plunge into the water at once to save life, only the coat and shoes should be removed.

Life-saving. It is often difficult to bring to shore a person who is drowning, for such people sometimes lose their presence of mind and grasp the rescuer so that he cannot swim. If the person to be saved has a clear head, he should be directed to place his hands lightly on the hips of the rescuer, who can then easily swim ashore with him; but if the drowning man has lost his presence of mind, the rescuer should approach him from behind, if possible, and push him to shore,

or even drag him by the hair, or by an arm or leg. If possible, his head should be supported, but this is not absolutely necessary. He should be brought to shore as quickly as he can be, either above or below water. In case he is insensible when brought to shore, or apparently drowned, the water must first be forced from his lungs, and he must then be made to breathe. Many ways of effecting this have been recommended. In all cases there must be no delay, as to wait even a few seconds may cause the loss of life. The patient should not even be removed to shelter, as that takes time, but he must be treated in the open air. Efforts to make the blood circulate must not be made till the patient begins to breathe.

To remove water from the throat, place the rescued man on the ground face downward, with one arm under the forehead, when the fluid will drain away. Breathing may now begin. If not, it may be excited by smelling-salts, by tickling the throat with a feather, by rubbing the chest and face, or by dashing cold water on them. If this is not successful, the motions of breathing must be imitated. Lay the patient on his face, supporting the chest by a folded coat. Turn him gently on one side, and a little beyond, and then back again. As the body is turned back on the face, the back should be pressed firmly between the shoulder-blades. These movements must be repeated every four or five seconds. When the patient is on his chest, the air is forced from the lungs, and when he is turned on his side the air enters again. While these efforts are being made, the hands and feet should be dried, the body stripped and dry clothes or coverings put on, without interfering with the movements described.

History. Men have been able to swim from the earliest times. The Israelites knew how, as we learn

from the Bible, and there are references to swimming on the Assyrian tablets in the British Museum. The ancient Greeks thought it so necessary that one of their proverbs, describing an uneducated man, was, "He knows neither how to read and write, nor how to swim." Swimming was taught to the Greek youths, especially the Spartans, as a part of their regular athletic training (see the history of **ATHLETICS**). The Roman soldiers were trained to swim, and swimming-races formed part of the Roman athletic contests. Julius Cæsar once saved his life by knowing how to swim. The Romans built enormous bathing-houses, of which there were 850 in the city at one time, one of which had a swimming-tank measuring 200 by 100 feet. The art has always been practised more or less, but in the last century it was opposed in Europe by many teachers and physicians who thought that it injured the health, and people did not learn it as generally as they do now. In the beginning of this century it came again into favor, and now almost every one thinks that both boys and girls should know how to swim. Swimming-schools are to be found in all countries, but the art is taught most carefully in France and Germany.

In France the method of learning the stroke before entering the water is in favor. It is said that out of twenty-six military cadets taught in this way, who were made to enter the river Marne, nineteen swam at once without further instruction. In this country this method is not favored. A recent writer on the subject says: "Ten minutes' work in the water is worth ten hours on a chair." The first writer on swimming in this country was probably Benjamin Franklin, whose advice to learners is often quoted. It is much the same as that given above, except that he advocates plunging at once into water breast deep after a white stone or other object, for

the purpose of teaching the swimmer the buoyancy of his own body.

Swimming-races, though not as common as other kinds, are frequently held, and skilled swimmers often attempt feats in the water, such as long distance swims, long swims under water, and the like. The records of some of these are given in the Appendix. It should be remembered that these are influenced greatly by the direction of the current or tide, or the fact that some were performed in a tank where the swimmer had to turn frequently.

RULES FOR SWIMMING RACES.

The rules of the National Amateur Athletic Union for swimming-races are as follows:

Sec. 1. Officials shall consist of one referee, three Judges at the finish, three Time-keepers, one Starter, one Clerk of the Course, with assistants, if necessary.

Sec. 2. Duties and powers of these officials shall be the same as is prescribed for them in the foregoing rules (see **ATHLETIC GAMES**).

Sec. 3. In the 100 yards swimming-race, each competitor shall stand with one or both feet on the starting-line, and when the signal is given shall plunge. Stepping back, either before or after the signal, will not be allowed.

Sec. 4. The half mile and one mile start shall be the same as the 100 yards, except that competitors may start in the water (tread-water start) from an imaginary line.

SEC. 5. A competitor shall keep a straight course, parallel with the courses of the other competitors, from his starting station to the opposite point in the finish line. Competitors will be started ten feet apart, and each one is entitled to a straight lane of water, ten feet wide, from start to finish. Any contestant who, when out of his own water, shall touch another competitor, is liable

to disqualification—subject to the discretion of the Referee.

SEC. 6. Each competitor shall have finished the race when any part of his person reaches the finish line.

SWINGING. Swings are made usually of a single rope, fastened at both ends, two to six feet apart, to the limb of a tree or a cross-piece of timber. The rope must be of such a length that the loop hangs within three or four feet of the ground. In the loop is fastened a wooden seat, on which the person who swings sits while a companion pushes him forward. The push is repeated every time the swing returns to its original position, and it thus rises a little higher each time, till the pusher can run quite under the swing, giving it a parting push as it swings up out of his reach. The longer the swing is the pleasanter the motion, for the person in a long swing moves more nearly in a straight line than in a short one, and the time of a swing is longer. A swing about thirteen feet long should go backward and forward in two seconds, one twenty-nine feet long in three seconds, and one fifty-two feet long in four seconds. The time is nearly the same, no matter whether the swing be sent high or low; if it be sent high it moves faster, so that it goes over its path in about the same time. The person who sits in the swing may move himself by pulling the ropes back, leaning backward and stretching out his feet every time the swing moves forward. It is better still to stand in the swing while executing this movement. Two persons standing in a swing face to face and doing this alternately may make the swing rise very high. This is called "pumping" or "working." Each must stoop down, lean backward, and push his feet forward while the swing moves in the direction he is facing.

Sometimes the person sitting in

the swing jumps from it, and contests may be held by two or more persons, in which each tries to jump farther than the others; but such jumping is dangerous, and may result in injury to one not accustomed to it. In thus jumping the forward impetus is given entirely by the swing, and the skill of the jumper is shown only in knowing when to jump. If he wait too long, until the swing is nearly at the end of its path, it moves so slowly that he will be given scarcely any forward movement; and if he jump too soon, the swing will not be far enough advanced.

The simplest form of seat for a swing is a board with a V-shaped notch in each end, which is fitted into the rope, and kept in place by the weight of the swinger. In another form the rope is put through a hole in each end of the board before fastening it at the top; or if the swing is made of two ropes, each is passed through one of the holes of the seat and tied beneath. Seats are sometimes made with backs and arm-rests. Such a seat may be formed of an old chair by removing the legs and fastening the rope to the seat. Two holes should be bored on each side, through each pair of which a rope is passed, and the ends of each of these ropes are tied to one of the swing ropes.

In pushing a rope-swing care must be taken that it is not given a motion to one side, or a twist. If it acquires either of these motions, the best plan is to stop and begin again. To stop a swing the pusher must wait till it has reached the point nearest to him, and then, seizing the seat or ropes with both hands, run forward with it, holding back with all his strength. The body should be inclined backward, and the heels dug into the ground at every step. The farther apart the ropes of the swing are at the top, the size of the seat remaining the same, the less likely it will be

to move sidewise. When the ropes are very near together, it is almost as easy to move the swing sidewise as straight ahead; but when they are far apart, the backward and forward motion is the easier, as will be seen by trial. When the ropes are farther apart and slope toward the seat, the swing is also less likely to twist. But, on the other hand, when the ropes are far apart it is harder to keep one's seat. A swing that will neither move sidewise nor twist can be made by fastening the ends of the rope to trees 30 to 50 feet apart.. The motion of such a swing is delightful, but it requires great skill to sit in it. Swings that will not twist are made also entirely of wood. They are usually hung in a wooden framework, which may be set up anywhere. Some kinds are set in motion by the swinger, who presses with his feet on a board in front of the swing.

SYNTHESIS, or SETTO, a game played by any number of persons with 64 cards, 25 of which contain each one root of a word; 19, three prefixes (or beginnings of words) each; and 15, three suffixes (or ends of words) each. There are also five prize-cards, each with one suffix. Words can be formed by putting a prefix before a root or a suffix after it, or both. Thus, with the root *act*, the prefix *trans* and the suffix *ion* can be formed the words *transact*, *action*, and *transaction*.

At the beginning of the game each draws a card, and he who gets the first prefix deals. There are several ways of playing. In the first method four cards are dealt to each player, and four are placed face upward on the table. When all have played their cards as described below, the dealer gives four more to each, and so on till all have been dealt, but no more are dealt to the table. The player at the dealer's left begins the game by trying

to make a word by combining cards on the table, using any of the prefixes and suffixes he pleases. If he can do so, he places the word in front of him, and it becomes his property. Whether he has been able to do so, or not, he then plays one of his own cards, and tries to combine it with some card or cards on the table in like manner to form a word. If he cannot, and has other cards in his hand which will form a word with the one he is playing, with or without any on the table, he may play, saying "I form," giving the word he intends to make, and piling together the cards that form part of it. He must take it as soon as possible, and can play on no other word before he does so. Any other player may take it by forming the announced word, but no other. If the player can neither take a word nor form, he must lay his card with the others on the table. The next player has the same choice, but instead of using his card to form a word with those in the middle of the table, he may add it, if possible, to the word the first player made, thus taking it away from him. The other players go on in like manner, each in his turn. When a word made by any one has remained uncaptured during one round, it cannot be taken afterward. When all the cards have been played, he who has taken the largest number of cards scores 3 points; and every word of 4 syllables scores 1 point, of 5 syllables 2 points, and of 6 syllables 3 points. When a player takes all the cards from the middle of the table, he is said to have made a "sweep" as in CASINO, and every sweep counts a point for him who makes it. In addition, the five prize-cards each count toward game the number of points marked on it. He who has most points wins the game.

Another way of playing is to give six cards to each, and put none on the table. The players must not

look at their cards. They play, in order, till some one can make a word with the cards on the table, when he takes it as before. Any player may retake it by putting on another syllable at any time during the game. But if a player can take more than one word in one turn, he may do so, and such words cannot then be retaken.

A third method is to remove the root-cards. Twelve cards are placed on the table, face upward, and the players have no cards, but each, in playing, may use any root in the English language.

In a fourth way of playing, the prizes are removed and four cards dealt to each. No one looks at his cards. The first prefix or suffix card played is called the Leader. A player may take all cards on the table any of whose syllables is the same as a syllable on the card he plays. The greatest number of cards like the Leader scores 3, every syllable like one on the Leader scores 1, and the greatest number of cards taken scores 2. The game is 13 points.

These games may be varied, or others devised, at the pleasure of the players. The word Synthesis is from two Greek words meaning a putting together.

Farrago. The same game as Synthesis, except that each card bears but one syllable. Farrago means a mixture. It was originally a Latin word, meaning a kind of mixed fodder for cattle.

SYRINGE. The force-PUMP is really only a syringe arranged to throw a steady stream. Simpler ones can be made as follows.

1. Cut off the top of a smooth round glass bottle so far below the neck that the remainder will be of the same size all the way down (see instructions for glass working under **CHEMICAL EXPERIMENTS**). Fit to it a piston like those described under

PUMP, without a valve. Now make a tiny hole in the side or bottom of the bottle, either by directing the tip of a **BLOW-PIPE** flame on the glass or by boring with a file moistened with turpentine. The smaller the hole, the greater the force with which the water can be driven out by pushing in the piston.

2. A syringe may be made also from a piece of any kind of wood that contains pith. The pith must first be punched out, and then one end of the pipe thus made must be plugged with a bit of wood having a small hole in the centre. The piston can be made as before.

SYRINX, or Pan-pipe, an ancient musical instrument. One can be made by a boy with an ear for music, of any wood that contains pith. Punch out the pith, and plug one end with a wooden stopper. By blowing across the open end, a rough musical sound can be made. By cutting different lengths and trying them, a perfect scale may be obtained. The pipes should now be fastened side by side to a cross strip so that all the open ends are in line, when a tune can be played on them with a little practice.

SYRUP, Experiment with. Three-quarters fill a bottle with very thick syrup, and then, having corked it, turn it upside down. After most of the syrup has descended to what is now the bottom of the bottle, what remains will form into a curious shape resembling a water-spout, large at the top and tapering at the bottom. The tapering part twists about curiously till all the syrup has run down, which takes several minutes.

Experiment with
Syrup.

T

TABLEAUX, or TABLEAUX VIVANTS (French for "Living Pictures"). A theatrical entertainment in which the performers neither move nor speak. The effect depends entirely on the dress, attitude, expression and grouping, as in a picture. Unless an artist is stage manager, tableaux are best made by copying an actual painting as nearly as possible in grouping, costume and background; or, if an engraving be copied, the colors may be arranged at pleasure. The chief thing to remember as regards colors is that the picture must neither be too sombre nor contain brilliant colors close together, whether on the figures or in the background. As it is very difficult for the performers to keep perfectly still, tableaux can be shown for only a few seconds at a time, and it is well to raise and lower the curtain several times. The great changes of scene necessary between the tableaux and the short time during which they can be shown often makes such exhibitions tiresome, and everything possible should be done to reduce the waits between the scenes. To this end no performer should take part in two consecutive tableaux, and as soon as the curtain falls on one scene the actors in the next should be ready to take their places. If possible, one background should be arranged behind another, so that it is necessary only to take away the first to show the second. One method is to make three frames, representing picture-frames, at the rear of the stage, either with or without separate curtains. Tableaux can be arranged behind these during the exhibition of one on the stage. It is then necessary only to lower the curtain while the actors leave the stage, raise the background curtain which concealed the frames in the

rear, and then raise the stage-curtain again, disclosing the new tableau. If the frames have separate curtains they may be raised and lowered alternately, one tableau being prepared while another is exhibited. Some of the frames may be made so as to show only the head and shoulders, in which case it is merely necessary for the actors to stand behind them. The background, in the case of small frames, should be black or very dark cloth. The illusion is heightened by having fine black gauze stretched between the stage and the audience. Instead of an ordinary curtain several curtains of white gauze may be let down, one by one, and then raised in the same way; the effect being to cause the picture to fade away gradually. This is especially effective when some slight change in the position of the actors is all that is necessary between two tableaux. One of the frames at the rear may be used to show a sort of panorama, a line of figures passing slowly behind it, each stopping for a few seconds at the proper place. The figures may represent historical or mythological characters; and a lecturer may describe them, pointing to each with a wand. In all tableaux, since the figures are seen on one side only, no care need be taken of that part of the costume turned away from the spectators. The faces should be colored or made up in the same way as for theatricals.

TAG. A game played by any number of persons, one of whom tries to touch or "tag" any of the others he can. If he succeeds, the one tagged must take his place. No player can be tagged when touching the "goal," or "bye," which is any object agreed upon, such as a tree, fence, or stone. Sometimes, instead of some particular object, anything made of a

given material is considered a "bye"—such as anything of stone, iron, or wood. The game is then called "Stone Tag," "Iron Tag," or "Wood Tag," as the case may be. The first tagger is generally selected at the opening of the game by COUNTING OUT.

Cross Tag. There is no goal in this form of the game, but any player who is chased can be relieved by any other player running between him and the one trying to tag him. The latter must then run after the player who ran between, till he in turn is relieved. When any one is tagged, he must take the pursuer's place as before.

Tree Tag. Each player chooses a tree as his goal, and cannot be captured while touching it except by some other player's going around it three times. When any player is touched by another, or captured at his tree, the tree of the one who captures him becomes his goal. The game ends when all the players are at one tree.

Squat Tag. When a player who is pursued is tired, he is allowed to stoop or squat close to the ground, the pursuer not being allowed to touch him while in this position. The number of squats allowed varies from two to eleven.

King's Land. A kind of Tag played by any number of persons, one of whom, representing the king, stands within boundaries agreed upon at the beginning of the game. The other players can be touched by him only when they venture inside the boundary; and when they do so they call out, "I'm on king's land; king can't see!" or similar words. By running in and out again on all sides they strive to confuse the king and divert his attention from one to the other.

In Connecticut the forbidden land is sometimes called Van Die-men's Land, in New York Dixie's Land, and in Philadelphia Golden

Pavement. The name for it in Devonshire, England, is Judge Jeffrey's Land, from the cruel judge of that name who lived in the reign of James II.

This game is sometimes called Rook's Castle, and the old English name for it was Tom Tiddler's Ground. The German boys, when they play it, say:

"King, I'm in your land;
I'll steal your gold and silver sand!"

In France, the king is called the Crow, and French children playing this game, say, "I am in your castle, Crow, and I shall always be there."

A similar game, though not a game of Tag, is KING'S CASTLE.

Several kinds of Tag are played in France. In one, called *Chat Perché* (Cat on a Perch), a player cannot be caught when his feet do not touch the ground; as, for instance, when he is on a bench or clinging to a tree. *Chat Coupé* (Cut Cat) is our Cross Tag. In a kind called *Mère Garuche* (Mother Garuche; probably from *gare*, meaning "take care!") the players, called Children, as they are caught must hold the hands of the first pursuer, and thus all must pursue together. Any pursuer may seize and detain whomever he can; but the original pursuer, Mother Garuche, must touch him before he is regarded as caught.

Gorilla. A kind of Tag in which the pursuer is called the Gorilla. The other players howl and make any kind of noise, but the Gorilla keeps perfectly quiet. As soon as he touches any player he begins to howl, while the touched player, becoming Gorilla, stops howling. The players know who is Gorilla by his silence, and can thus avoid him.

TAKE CARE. A game played by any number of persons in several ways. In one of the most common, flour is packed tightly into a bowl, which is then turned over

and removed, leaving the flour in a mound. On top of this is placed a small coin. The players in turn then remove each a part of the flour with a knife, and whoever lets the coin fall must pick it from the flour with his teeth. Sometimes each one says "take care" as he cuts off his portion of the flour, and the game thus receives its name.

There are many substitutes for the flour and coin. One of the best is a card-house of two cards on a pile made of the rest of the pack loosely thrown together. Each player removes one card, and he who allows the card-house to fall must pay a forfeit. The game may be played out of doors with a little flag stuck in a pail of sand, from which each player removes a little on the end of a stick.

TALKING MACHINES. A machine to say the word "Mamma" can be made as follows: Take a toy trumpet, and holding the small end in the mouth place the two hands over the funnel. By blowing through the trumpet and opening and shutting one hand the syllable "Ma" can be produced quite plainly. By repeating this the word "Mamma" can be spoken.

A very good imitation of the human voice can be made also by stretching two india-rubber bands across the end of an empty spool (see illustration). The edges of the bands should be close together without overlapping. On blowing through the other end of the spool the bands vibrate like the human vocal chords,

Talking Spool.

and make a sound something like the voice, which changes with the force of the breath.

TASTE, Experiments on. 1. To find which of the company has

the most delicate sense of taste, dissolve a little sugar in water so as to make a slightly sweet solution. Pour half of this into a glass and replace it with pure water. Put half the diluted liquid into a second glass, replace it with pure water, and so on till the liquid cannot be distinguished from ordinary water. The liquid must not be too strong to begin with, or too many dilutions will be required. Care should be taken to keep the glasses in proper order, as, if they should be mixed, it would spoil the experiment. Now place on the table the glass containing the strongest solution, and one of pure water, and let the company enter one at a time, blindfolded. Give each to drink several times from the two glasses, in any order you please, asking him after each taste whether he had pure or sweetened water. Care should be taken to have glasses alike, and filled to the same height. Those who tell incorrectly are considered "out." Those who make no mistake take part in a similar trial in which the next weaker solution is used. This goes on till only one is left who can taste the sugar-water, who is declared to have the most delicate taste.

The experiment may be tried over again, using first salt and then vinegar, instead of sugar. It will often be found that he who has the most delicate taste for sugar cannot detect acids as easily as some one else.

2. Prepare three glasses of water, dissolving a little quinine in one, salt in the second, and leaving the third pure. After holding some of the bitter or salt water in the mouth for a few seconds, swallow some of the pure water, and it will taste sweet.

TEA-KETTLE. A game played by any number of persons, one of whom leaves the room while the others agree upon a word with sev-

eral different meanings, or upon two or more words pronounced alike. The player who went out now returns and asks each in turn a question. The word or words agreed on must be introduced several times in the answer, but instead thereof the word "tea-kettle" must be substituted. If the word is compounded with another or with a prefix or suffix the word "tea-kettle" must be similarly compounded. Thus, suppose rain, rein, reign, to be the selected words. The first question may be, "How do you do?" to which the answer is returned: "Not very well, for I was out yesterday in the biggest tea-kettle of Queen Victoria's tea-kettle." The next may be asked, "Do you enjoy riding?" "That depends on the tea-kettles, and also on whether it is tea-kettle-ing or not." The player from whose answer the word is guessed becomes questioner in turn, leaving the room while another word is decided on.

TEETOTUM. See TOPS.

TELEGRAPHS. The electric telegraph is described in C. C. T. under this head. A simple one on Morse's system may be made as follows: To telegraph between two stations requires two sounders, two keys, a battery and a line of wire.

Sounder. Make a small electromagnet (see MAGNETS) about two

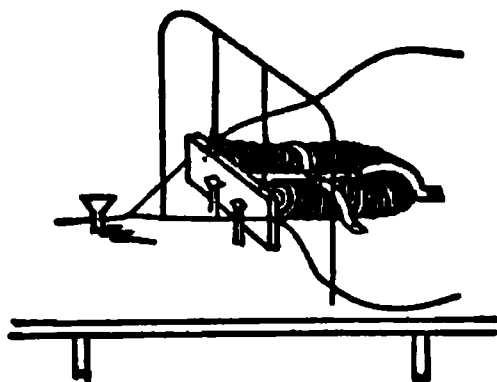


Fig. 1.

inches long. Fasten it on its side on a strip of board by tacking strips of cloth or leather over it, and from a piece of bent wire over it suspend the armature by threads so that it

will hang as close as possible to the poles without touching them. (See Fig. 1.) When a current passes through the magnet wire the arma-

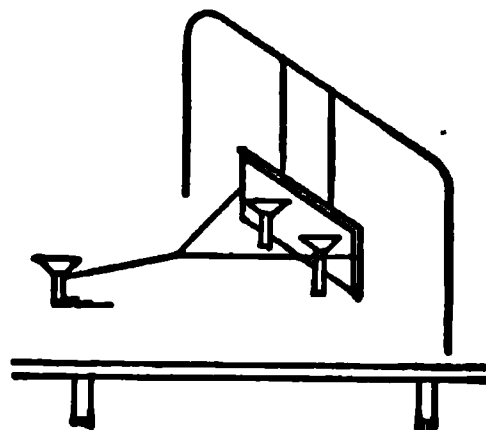


Fig. 2.

ture will be attracted and will make a clicking sound. Put in two brass screws behind the armature, so that it will touch them as it hangs, and then attach it by pieces of elastic to another screw at a distance of two or three inches, so that the elastic will pull it back against the screws when the current is off, thus making another click. The elastic must not be so strong as to prevent the magnet's drawing the armature to itself. The mode of holding back the armature is shown on a larger scale in Fig. 2.

Key. Procure two strips of brass, one two inches long and the other

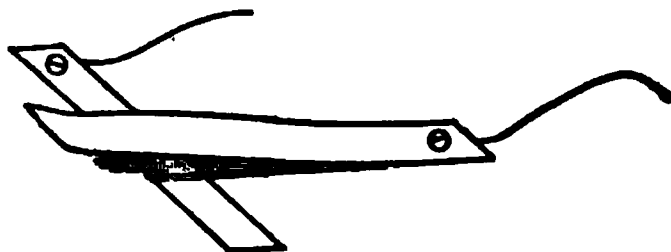


Fig. 3.

four. Punch a hole in one end of each and screw them to the same board with the sounder, at right angles to each other, the free end of the long piece just lying across the middle of the short one. Bend the long piece upward a little, near the screw, so that in its natural position it will not touch the short piece. (See Fig. 3.) By pressing the end of the long piece down, contact can be made between the two, and if they are to be left in con-

tact the long piece can be caught under the free end of the short one by turning it aside on the screw as a pivot. (See Fig. 4.) The wires

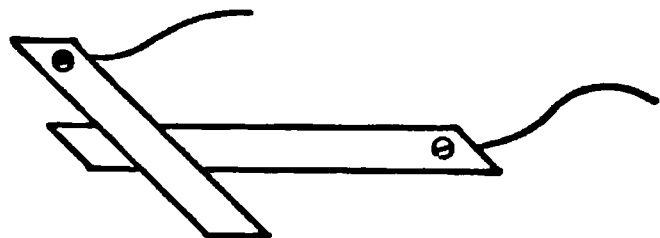


Fig. 4.

are attached to the strips by being wound once around the screws, just before screwing them down tight.

Battery. The best battery to use is a Gravity (see *ELECTRIC BATTERIES*), but any other will do except the Leclanché and similar cells, which weaken very fast when the current is passing. In a telegraph the current has to pass all the time, for if the circuit were broken at one station it would be impossible to signal from the other when a message was to be sent. The best place for the battery is in a box under the table on which the instruments stand.

Line Wire. The size of the wire between the stations depends somewhat on distance. In telegraphing from one room to another in the same house, small insulated wire may be used, which may be secured along the edge of the floor, where it will not be seen, by means of double-pointed carpet tacks. If the line is to be out-

doors ordinary telegraph wire should be used, which is fastened to trees or posts by insulators, so that the current may not be drawn away. Glass insulators may be bought of a dealer in telegraph supplies, but simple ones can be made of rubber tubing cut into pieces about an inch long. A nail is driven through the tubing lengthwise into a tree, and the wire is wound once or twice around it.

Ground Connection. Where the two stations are in the same house, the circuit consists of wire both ways, but where the line passes outdoors the current passes one way through the wire, and back through the ground. Where there are gas pipes, connection with the ground can be made by simply winding one end of the wire tightly around one where it is exposed. Where there are no gas pipes a wire must be carried to the ground, where the end is attached to a copper plate about a foot square and buried deep enough to be constantly in moist ground.

Connections. The different instruments may be connected in any order desired, but the following directions should be observed by those who wish exact instructions. Connect one wire of the battery with the ground wire, and the other with one end of the wire around the electro-magnet of the sounder. The other magnet wire is connected with one of the brass strips of

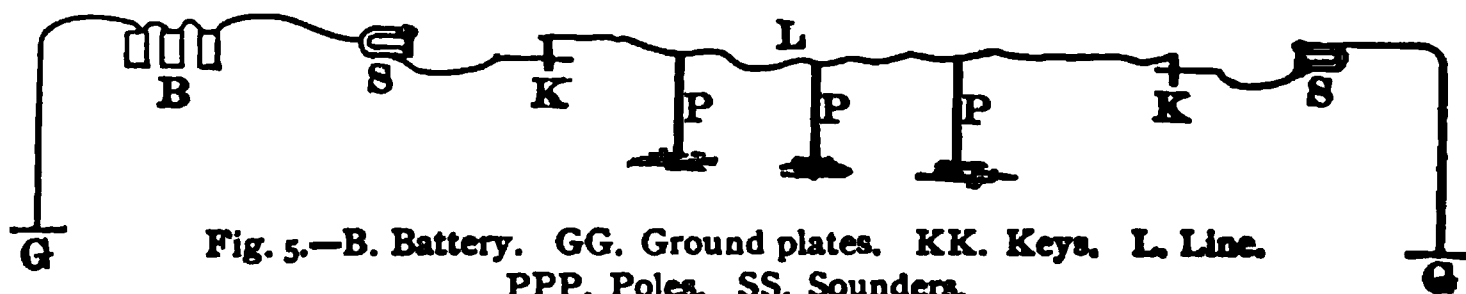


Fig. 5.—B. Battery. GG. Ground plates. KK. Keys. L. Line. PPP. Poles. SS. Sounders.

the key, and the other strip with the line wire, as shown in Fig. 5. At the other station the same connections are made, except that there is no battery, so that one of

the magnet wires is connected directly to the ground wire. If there are to be one or more stations between the end ones, each must have its key and sounder. The

wire is "grounded" only at the end stations. The connections are best made by brass binding screws, which can be bought of a dealer in telegraph supplies; but they can be made almost as well by winding the ends of the wires tightly around each other, and pounding them close together with a hammer. The better the connections the better the telegraph will work.

Telegraphing. The alphabet used is the Morse, described in C. C. T. This consists of a combination of dots and dashes. To make a dot, the key is merely tapped down with the finger, so that contact is made for an instant only. To make a dash it is held down a little longer. The operator at the other end must read the message by sound. He can hear the click made by the armature striking the magnet when the key is pressed down, and the click made by its hitting the screws behind it when the key is raised and the elastic pulls it back. If the interval between these two clicks is short, he knows a dot has been made; if a little longer, a dash. With a little practice it will be easy to read thus, even when messages are sent very swiftly. To practice reading it is not necessary to have a telegraph instrument—anything which will make two clicks in the same manner will do; for instance, a stick moved backward and forward between two fence palings.

The keys must be kept pressed down all the time at all stations, except when a message is being sent. A signal or call, consisting of any arrangement of dots and dashes, must be agreed on, to be given before a message; and no message should be sent till the signal has been given and answered, showing that some one is at the other station to receive it. The answer may consist of a repetition of the signal or

some other combination of dots and dashes. If there are more than two stations, each must have a different call, for all the sounders on the line click when a message is sent.

Wheatstone Telegraph. In this telegraph the receiving instrument consists of a galvanometer, and the key is replaced by a commutator, or arrangement for reversing the current.

Galvanometer. The instrument described in the article under this head can be used, but a pin must be stuck in the dial card just on each side of the needle, so that it may move only a small fraction of an inch, otherwise time would be lost in waiting for it to stop swinging. When the current flows one way the needle turns to the right, and when it is reversed, to the left. The Morse alphabet may be used, one direction meaning a dot and the other a dash.

Commutator. A simple commutator, or current reverser, can be

Fig. 6.

made as follows: Fasten two strips of brass *C* and *D* (see Fig. 6) to a block of wood by screws at *C* and *D*, and at the other end fasten two cross strips, *A E* and *B F*, the former passing below and the latter above the two first strips. Bend

the strips *C* and *D* upward so that when at rest they will press against *B F*. Join the line wires to *C* and *D* and the battery wires to *A* and *B*. Then, by pressing down the strip *D*, the current travels in the direction of the arrows marked 1, and, if the strip *C* be depressed, in the other direction. There must be a battery at each end of the line; but, as will be seen by observing the way the commutator makes connections, only the battery at the signalling station furnishes current to the wire.

Electro-Chemical Telegraph. Dissolve some ferrocyanide of potassium in water, and soak unglazed paper in the solution. Connect the paper with the negative pole of an ELECTRIC BATTERY, and connect the positive pole with a steel nail. Write with the nail on the paper, and a blue mark will be produced. This is because the chemical on the paper is decomposed by the electricity, forming Prussian blue. Now let one person, with the paper and nail, remain in one room and the wire which connects with either pass through another room, through a key, to make and break the circuit. The person with the nail draws it across the paper so as to make a straight line, while another telegraphs with the key, using Morse's alphabet. The dots and dashes will appear in blue on the paper, since whenever the key is down the current passes and the Prussian blue is formed, but when the key is up the nail makes no mark at all.

Flash Telegraph. The simplest way to telegraph by flashes of light is to place a common kerosene lamp in a soap box, cutting a hole in the top to admit the chimney, and boring several holes in the bottom to admit air. At the end is a hole about two inches in diameter, covered by a shutter made of a flat piece of wood screwed loosely to the box by one

corner, so that it can swing down over the hole. Each telegrapher has a box arranged in this way, and the signals are sent by opening and shutting the shutters. The best way is to use the Morse alphabet, opening the shutter for only an instant to represent a dot, and longer for a dash. This telegraph can be used as far as the light of a kerosene lamp can be seen. To distinguish the light from that of other lamps near it the hole may be covered with colored glass. If the apparatus is to be used in the open air some kind of glass, either clear or colored, must be put over the hole to prevent the wind from putting out the lamp.

Heliograph, or Sun Telegraph. The flash telegraph just described can be used only for short distances, but the sun's rays, reflected by a mirror, can be seen twenty or thirty miles, and sometimes even farther. The sending and receiving stations are usually on the tops of high hills. To be sure that the ray is sent in just the right direction, the mirror must first be made steady and yet free to turn. It may be supported on a tripod or gimbals, such as a compass is hung on, but a simpler way is for a boy to hold it firmly in his lap as he sits on the ground. For long distances a large mirror several feet square should be used. Scratch away a bit of the silvering as large as a pin-head from the back and then, looking through the hole thus made toward the place where the signal is sent, bring some small object into the line of sight. The object must be steady and not large enough to obstruct the beam. The best thing is a bit of wire supported on another tripod, or, more simply, nailed against a tree so that it projects to one side. Now, all the boy with the mirror has to do is to see that he keeps it steady and throws his beam of light on the wire, for this is in line with the distant point

where the signal is to be sent. The light can be cut off for a greater or less time by holding a piece of cloth, a board, or a coat in front of the mirror, and thus the Morse alphabet can be used as before.

Other Uses of the Morse Alphabet. This alphabet can also be adapted to hundreds of other systems of telegraphy where electricity is not used. Wherever two kinds of signals can be sent from one point to another where they are observed by any of the senses, one signal can be used as a dot and the other as a dash, and hence they can be combined to form letters. The following examples show how the signals can be received through any of the five senses.

Hearing. Two persons may communicate with each other by long and short whistles or by raps on a table.

Sight. Besides the flash telegraph described above, motions of the hand or of a flag to the right and left may represent dots and dashes, or, by night, lanterns of two different colors may be used, one for dots, the other for dashes. In a crowded room two persons may thus communicate by motions of the head or finger, unnoticed by the rest of the company.

Touch. Taps with the finger or light scratches with a pin may be used in the same way.

Smell. A person blindfolded and having his ears stopped may have a message sent him by means of two odors, for instance by holding a rose and a violet near his nostrils.

Taste. Two substances may be touched to the tongue in like manner, or an ordinary electric-telegraph message may be received by means of the GALVANIC TASTE, the end of one wire being placed on the upper surface of the tongue and the other beneath it, and the electro-magnet being dispensed with. This requires some practice, but has been done successfully.

TELEPHONE. The electric telephone is described in C. C. T., under this heading. An acoustic or non-electric telephone which works well for short distances can be made as follows: Procure two pieces of smooth pine board sixteen inches long by thirteen wide, and three-eighths of an inch thick. Cut in each a hole nine inches in diameter, and bevel the edges of the holes on one side of the board (see Fig. 1). To the ends of each board, on the side not bevelled, nail strips of pine three inches wide, one-half inch thick, and thirteen inches long, so that the side view will be as in Fig. 2.

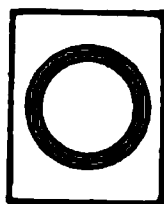


Fig. 1.

Now buy a calfskin drum-head (which can be obtained of a dealer in musical instruments), and cut out of it two round pieces large enough to be tacked over the holes in the boards just prepared. The skin which is placed on the bevelled side of the hole should not be stretched tightly over it, but only enough to smooth it. The tacks must be put in close together, and about half an inch from the edge of the skin. The skin is now stretched by hanging a weight to it. In an old-fashioned



Fig. 2.



Fig. 3.

copper cent bore two holes large enough to admit number 15 copper wire (Fig. 3). Pass a piece two or three feet long through one hole and back through the other, twist the ends together (Fig. 4) and then pass them through a hole exactly in the centre of the skin, from the tacked side. Place the board on the edges of two tables (Fig. 5), so that the wire will be between them, and hang to it about thirty pounds. Wet the skin on both sides with a moistened sponge, and it will stretch, forming a con-



Fig. 4.

cave surface (Fig. 6). After two or three hours, when it is dry, remove the weight, and the skin will keep this shape. This arrangement is

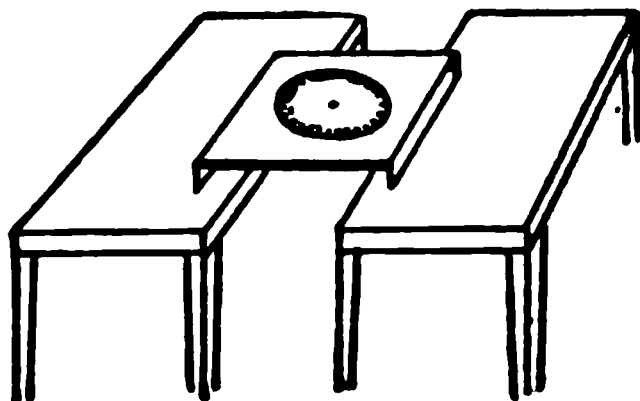


Fig. 5.

called the "disk." It may be bordered with leather, as shown in Fig. 7. Now bore a hole in the wall of

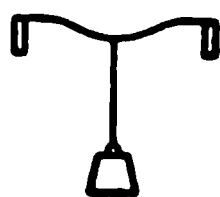


Fig. 6.

the house where the telephone wire is to pass through it, and screw the disk to the wall so that the hole in the middle will be exactly opposite that in the wall (see Fig. 8). For the "line wire" from one disk to the other (which is fastened in like manner at the other end of the line) number 15 copper wire is the best. One end of the wire is passed through the hole in the wall and that in the disk, from the outside, through a copper cent, or large button, as described above (Fig. 4), then out again, and secured by twisting around the main wire. The wire

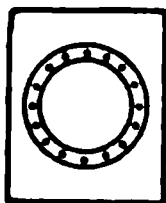


Fig. 7.

must not touch the sides of the hole through which it passes, nor must it touch a tree or wall between the two stations. If it must pass around

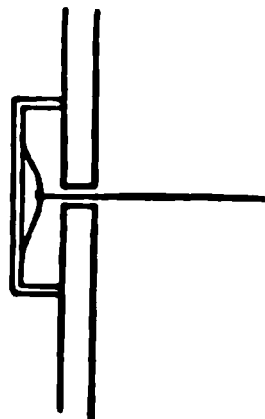


Fig. 8.

a corner it must be kept from touching by means of little loops of cord called insulators. The best insulators are made of pieces of cord four inches long and three-sixteenths of an inch in thickness. The ends are brought together

(Fig. 9) and secured by winding with fine copper wire (Fig. 10). As



Fig. 9.

many of these insulators as are needed are strung on the wire before it is put up (Fig. 11), and the wire can be kept away from any obstacle by tying one



Fig. 10.

to a tree or pole (Fig. 12). The wire should never be bent at a right angle, but two insulators may be used, as in Fig. 13, where the wire *ab* is seen carried around a corner.

The wire attached to the disk at the farther end should be only a few feet long, and the main wire should be tightened before the two pieces are connected. The

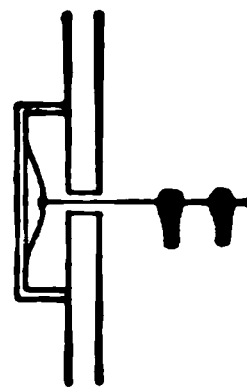


Fig. 11.

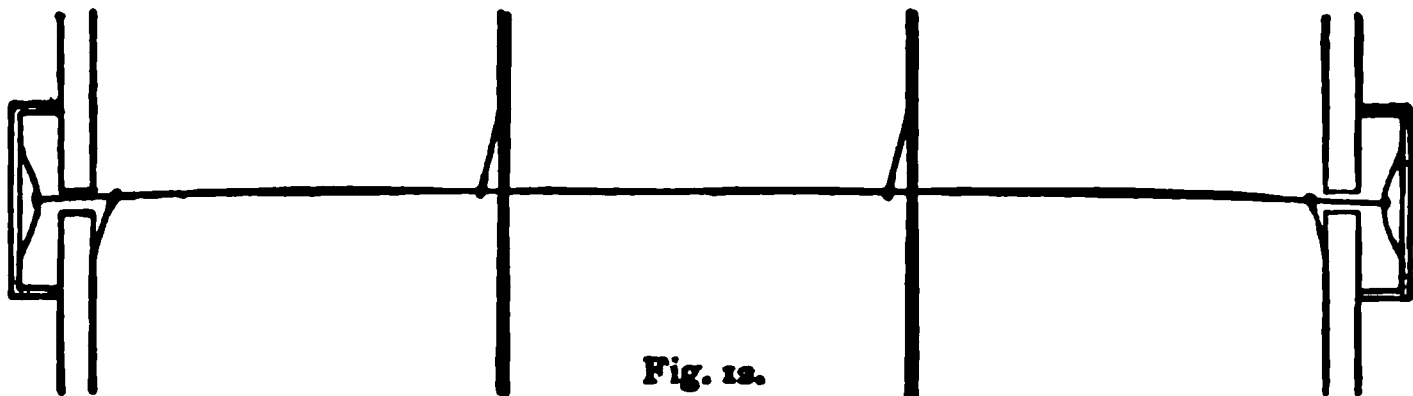


Fig. 12.

tightening can be done by a pulley screwed to the outside wall of the house at the farther station. When the line is as tight as possible, one

person should hold it while another fastens to it the short wire from the other disk by making a "telegraph splice," shown in Fig. 14.

The tighter the wire the better the telephone will work. If it still sags it may be tightened by tying it by insulators to the limbs of

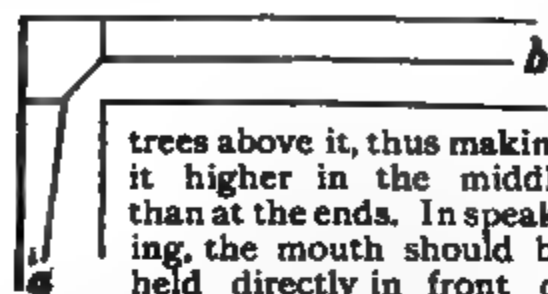


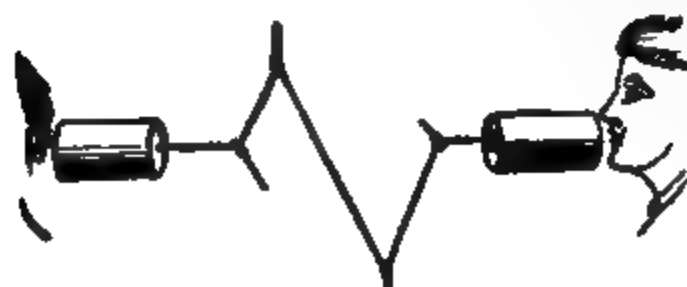
Fig. 13.

trees above it, thus making it higher in the middle than at the ends. In speaking, the mouth should be held directly in front of the button on the disk, about six inches from it.



Fig. 14.

Lovers' Telegraph. A simple acoustic telephone made of tin boxes, paper and string. Remove the top and bottom from two baking-powder boxes, and over one end of each tie tightly a piece of parchment paper (see SULPHURIC ACID, experiment 4). Through a hole in the middle of each paper pass one end of a piece of waxed cord, and prevent it from pulling through by knotting it. The cord thus connects the two boxes; and if a person holding one speak into it, he can be heard by one who holds the other box to his ear. The cord between the boxes must not touch anything. If the cord is too long, its weight will break the parchment paper, but if the heads of



Lovers' Telegraph.

the boxes are made of drum-head skin it can be made much longer.

TENNIS. A game played with a ball and a bat strung with gut, called a racket. There are two kinds—Court Tennis, or Tennis proper, and Lawn Tennis. The latter is more common and simpler,

Rackets.

and will therefore be described first.

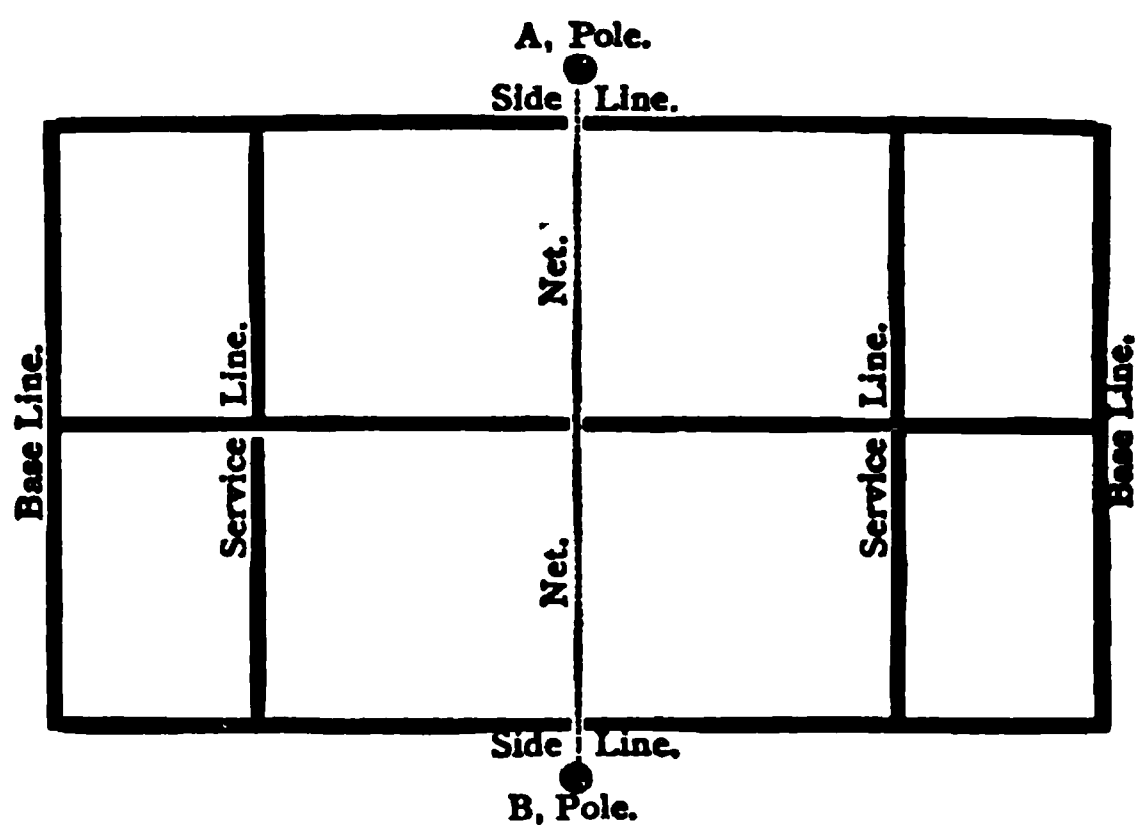
Lawn Tennis is played by two, three, or four persons, on a piece of ground called a court, of the shape and size shown in the diagrams.

The balls are of hollow rubber covered with cloth; the rackets, or racquets, are strung with cord or gut, as seen in the illustration.

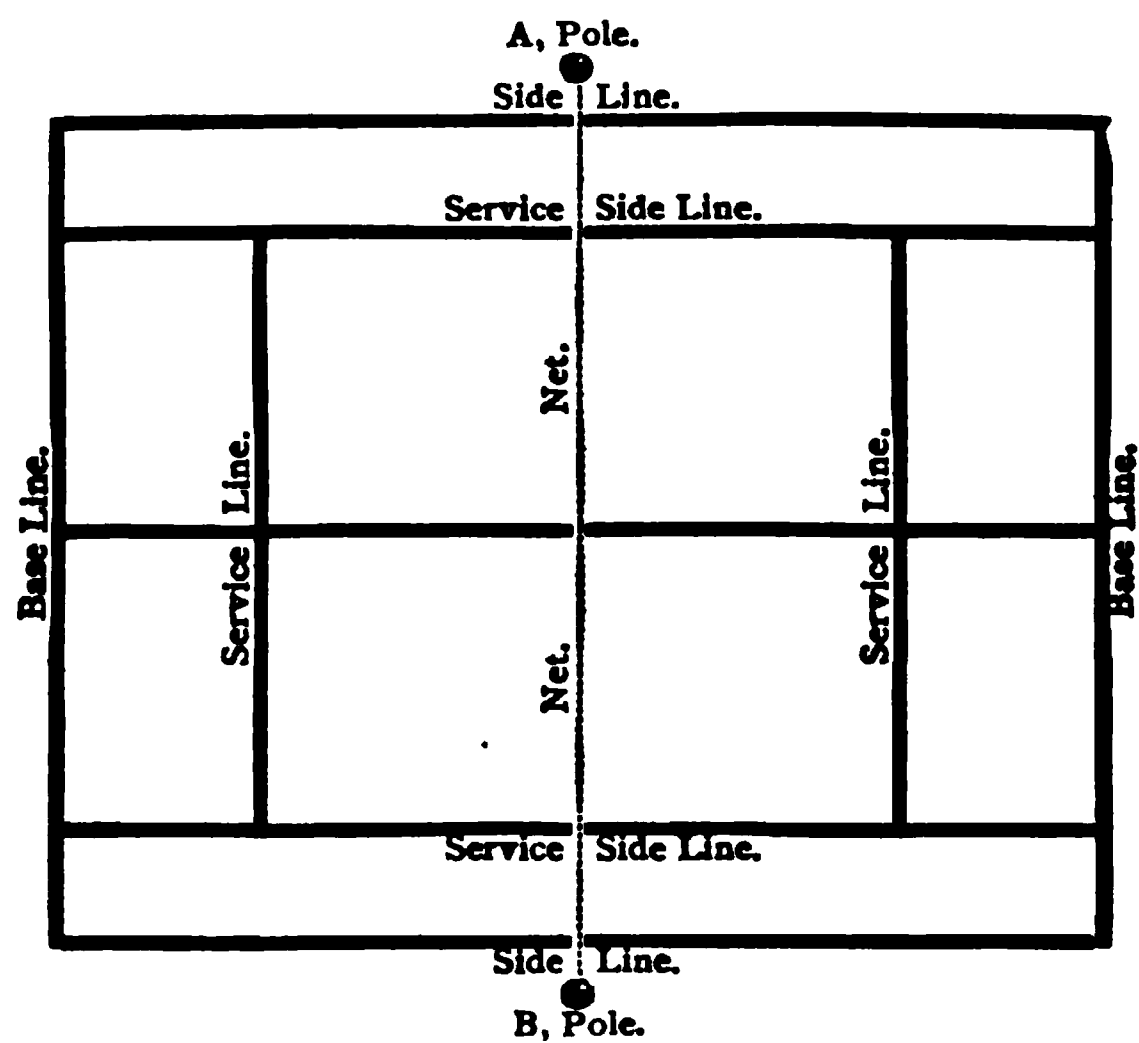
The courts may be on smooth turf or hard bare ground, or the game may be played indoors on a bare wooden or cemented floor. The lines are marked out-

doors with whitewash, powdered marble dust, high grass or white

tape, and indoors with chalk or paint. At A and B, in the diagrams, are two posts, between which a net is strung across the court. The smaller rectangles into which the lines divide the court



SINGLE COURT (FOR TWO PLAYERS).
Dimensions : Length, 78 feet ; Width, 27 feet ; from Net to Service Lines, 21 feet.
(Height of net, centre 3 feet, sides, 3½ feet).



DOUBLE COURT (FOR TWO, THREE, OR FOUR PLAYERS).
Dimensions : Length, 78 feet ; Width, 36 feet ; Net to Service Line, 21 feet ; Service Side Line to Side Line, 4½ feet. (Height of net, center 3 feet, sides 3½ feet.)

are also called courts. The illustration given below represents a four-handed game ; but, by omitting the side lines and ladies' figures, it will represent a two-handed game as well.

The two-handed game will be described first. The players decide by lot who shall have the first turn, and on which side of the net each shall play. Usually one throws a racket into the air and the other calls out "rough" or "smooth." Each racket has a rough and smooth side, and, if the one that calls has named correctly the side that falls uppermost, he may take choice of turns or choice of courts as he pleases. Otherwise his opponent has the same privilege. If the winner of the toss elect to choose which turn he will take, his opponent has choice of courts, and *vice versa*. Each player now goes to his own side of the net, and the one who has obtained the first serve standing behind the rear line of his court (called "base line") at the right, as shown in the figure (see Rule 6 below), strikes the ball with his racket over the net and into the court next the net on his left. This is called "serving." If the ball fails to go over the net or strikes in the wrong court it is said to be a "fault" and the server must try again. If his second service is also a fault it is called "doubles," and his opponent scores a point. If the ball touch the net, but go over it, it does not count as a service, but is called a "let," and played over again. While the player is serving, his opponent, who is called the "striker-out," stands where he pleases. When a fault is made he cries out "Fault." When he gets a good ball he must strike it, after it has bounded once, so that it will pass over the net into any of the courts on the opposite side. This is called "returning" the service. After the return, the ball may be struck either on the first bound or before it has bounded. If the latter, it is said to be "volleyed." The players strike the ball from one to the other across the net in this way till one of them fails, either by missing the ball entirely, or by striking it into the net, or by sending it

beyond the boundary of the entire court. His opponent then scores a point. After the service a ball is good even if it strikes the net in going over. When two faults have been made, or either player does not return the ball properly, there must be another service by the same player as before, but this time from the left of his service line into the court next the net on his right, his opponent changing position also so as to receive the service. The same player serves each time till the game is ended, first from one rear court and then from the other. His opponent serves in the second game, and they alternate thus as long as they play; but a player must always serve from the right at the beginning of a game, no matter which court he served from last.

The method of scoring in Lawn Tennis is peculiar. When a player has no points his score is called "Love," and when neither has a point the score is "Love-All." The first point a player scores is called "Fifteen," the second "Thirty," the third "Forty," and the fourth "Game," except as noted below. The state of the score is described by calling out together the points of the players, that of the server first. Thus "Forty-Love" means that the server has forty to his opponent's nothing, and "Fifteen-Forty" that he has fifteen to his opponent's forty. "Thirty-All" means that each has thirty. The one whose score reaches the "Game" point first, wins. But whenever the score is "Forty-All" it is called "Deuce," and then the next point is not "Game," but "Advantage" (usually called "Vantage"). If the player winning 'Vantage gains the next point, he scores Game, otherwise the score is brought down to Deuce again. Hence, when the score is once Deuce, the game often lasts a long time with evenly-matched players.

When the server has 'Vantage, the score is called 'Vantage In; when his opponent has it, 'Vantage Out. When a player has won six games he has won a "set," no matter whether his opponent has won five games or none at all; so an ordinary set may include from six to

eleven games. Where the players are evenly matched it is often agreed that "'Vantage sets" shall be played. In this case no player wins till he is two games ahead of his opponent, and a set may therefore consist of any number of games over eleven (see Rule 23).

Double Lawn Tennis.

In reporting the score of a set the number of games won by each player is given, separated by a dash. The score of a series of sets is represented by several such combinations, separated by commas; and in each the first number is the score of the winner of the whole series. Thus the abbreviated score "Jones beat Smith 6-0, 4-6, 6-5,"

means, that in the first set, Jones won six games to Smith's none, in the second, four to Smith's six, and in the third, six to Smith's five, thus winning two out of three sets.

During the game each player tries to make his opponent fail, sometimes by striking the balls into an unexpected part of the court or first on one side of the court and

then on the other, so as to tire him out in running forward and back-

the different modes of striking the ball, in service and return, are shown in the figures. Figs. 1-3 and 6 represent methods of service, and Figs. 7-10 return strokes. Practice and judgment are required to choose the proper one. Some tennis players stand close to the net after they have served, and volley all the balls the more difficult way; others prefer to stand at the service line and take most of them on the bound.

Fig. 1.

ward to return them. Sometimes the balls are so struck that they will bound in an unexpected direc-

Fig. 3.

To cut the ball is to strike it so that it will spin in the air, by holding the racket not squarely but a little sidewise. If it be made to spin, as shown by the curved arrow in Fig. 4, while moving from left to right in the direction of the large arrows, the spin will tend to make the ball roll forward along the ground, so it will bound forward much closer to the ground than might be expected. In Fig. 5 the spin tends to make the ball roll backward along the ground, so it will bound not so close to the ground as it otherwise would; it

Fig. 2.

tion. This is done by "cutting," as will be explained below. Some of

may bound straight up, or even backward a little. By giving the



Fig. 4.



Fig. 5.

ball a spin in other directions it can be made to bound in various ways. With practice it is possible to tell from the way a ball is struck just what kind of a cut it has been given, and so what kind of a bound

various ways in which the racket must be held, according as the ball

Fig. 7.

is high or low, to the right or left, can best be learned by practice.

Fig. 6.

to expect; so, skillful players generally use the cuts only in connection with very swift strokes. A stroke that is sometimes used close to the net is made by loosening the hold on the racket just as it hits the ball. The ball thus bounds very little from the racket, and simply drops over the net, very close to it. In playing, it is often necessary to strike the ball while running, and good players learn to vary the force of their strokes according as they run with the ball or against it. The

Fig. 8.

Some players learn to use the racket with either hand.

In serving, the different methods of striking a ball can be made more effective than in returning; for in serving the player's own time can be taken, and he can throw his ball into the air to strike it as he wishes; but in returning there must be no delay and the ball must be taken as

and the other in the rear, or one playing in left and the other in right hand courts, called "playing sides."

*RULES OF THE GAME.
(As adopted by the National Lawn Tennis Association.)*

The Court. 1. The Court is 78 feet long and 27 feet wide. It is divided across the middle by a net, the ends of which are attached to two posts, standing 3 feet outside of the court on either side. The height of the net is 3 feet 6 inches at the posts, and 3 feet in the middle. At each end of the court, parallel with the net, and 39 feet from it, are drawn the base lines, the ends of which are connected by the side lines. Halfway between the side lines, and parallel with them, is drawn the half court line, dividing the space on each side of the net into two equal parts, the right and left courts. On each side of the net, at a distance of 21 feet from it, and

Fig. 9.

it comes, often with a spin or in an awkward place. It is therefore of great importance to learn to serve well.

Three and Four-Handed Lawn Tennis. The game is played by one person against two, or by two on a side. The court is widened for the play after the service, but the service courts remain the same size, as shown in the figure already given.

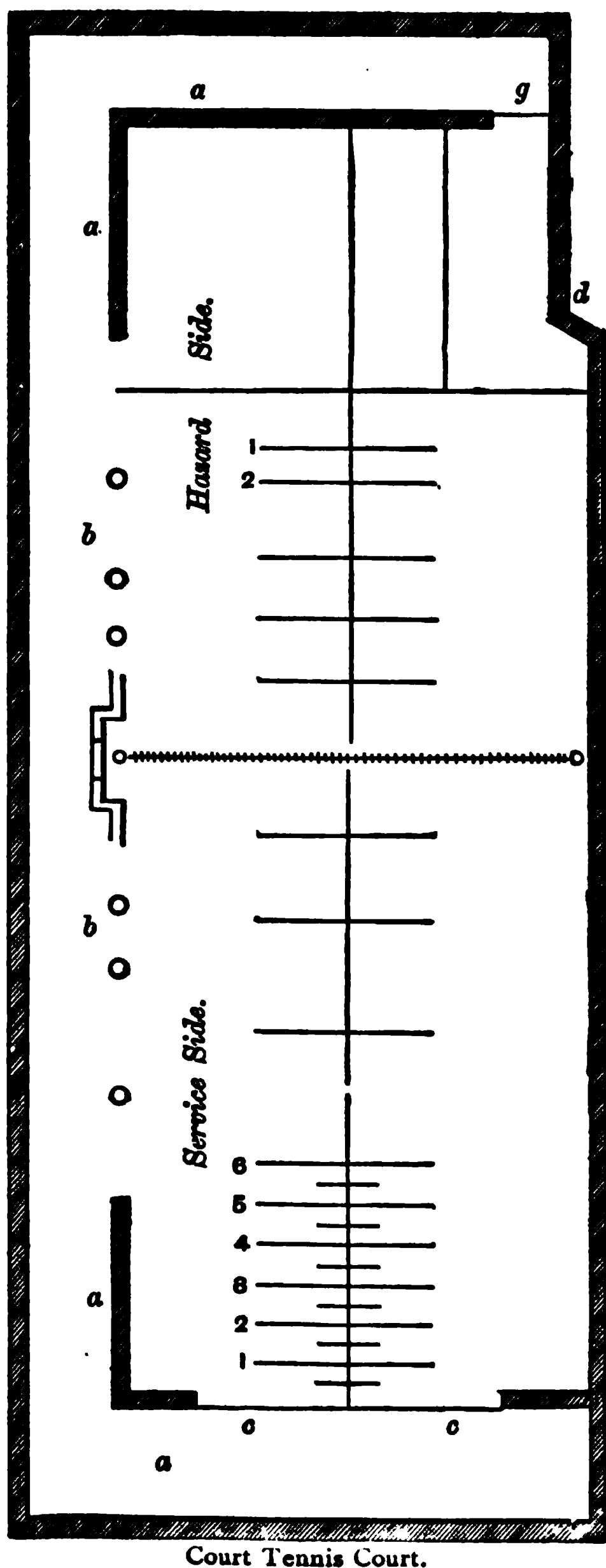
In the three-handed game the single player serves every alternate game. In the four-handed game, the order of serving and receiving is agreed on at the beginning of the set, and continues the same till the end, but partners must serve alternately. (See Rules 31-34, below.) After the service all the players take part in the game, one on each side usually playing close to the net,

Fig. 10.

parallel with it, are drawn the service lines.

The Balls. 2. The Balls shall measure not less than $2\frac{1}{8}$ inches, nor more than $2\frac{1}{2}$ inches in diameter; and shall weigh not less than $1\frac{1}{8}$ ounces, nor more than 2 ounces.

The Game. 3. The choice of



sides, and the right to serve in the first game, shall be decided by toss; provided that, if the winner of the toss choose the right to serve, the other player shall have choice of sides, and *vice versa*, or *the winner of the toss may insist upon a choice by his opponent*. If one player choose the court, the other may elect not to serve.

4. The players shall stand on opposite sides of the net ; the player who first delivers the ball shall be called the server, and the other the striker-out.

5. At the end of the first game the striker-out shall become server, and the server shall become striker-out; and so on alternately in all the subsequent games of the set, or series of sets.

6. The server shall serve with one foot on the ground immediately behind the base line ; the other foot may be anywhere except touching the base line or the ground within the court. He shall deliver the service from the right to the left courts, alternately ; beginning from the right.

7. The ball served must drop between the service line, half-court line, and side line of the court, diagonally opposite to that from which it was served.

8. It is a fault if the server fail to strike the ball, or if the ball served drop in the net, or beyond the service line, or out of court, or in the

pire shall decide or direct the stroke to be played again.

THREE-HANDED AND FOUR-HANDED GAMES.

29. The above laws shall apply to the three-handed and four-handed games, except as below :

30. For the three-handed and four-handed games the court shall be 36 feet in width; $4\frac{1}{2}$ feet inside the side lines, and parallel with them, are drawn the surface side lines. The service lines are not drawn beyond the point at which they meet the service side lines, as shown in the diagram.

31. In the three-handed game, the single player shall serve in every alternate game.

32. In the four-handed game, the pair who have the right to serve in the first game shall decide which partner shall do so; and the opposing pair shall decide in like manner for the second game. The partner of the player who served in the first game shall serve in the third, and the partner of the player who served in the second game shall serve in the fourth, and the same order shall be maintained in all the subsequent games of the set.

33. At the beginning of the next set, either partner of the pair which struck out in the last game of the last set may serve; and the same privilege is given to their opponents in second game of the new set.

34. The players shall take the service alternately throughout the game; a player cannot receive a service delivered to his partner; and the order of service and striking out once established shall not be altered nor shall the striker-out change courts to receive the service, till the end of the set.

35. It is a fault if the ball served do not drop between the service line, half-court line, and service side line of the court, diagonally opposite to that from which it was served.

36. It is a fault if the ball served do not drop as provided in law 35,

or if it touch the server's partner or anything he wears or carries.

Court Tennis. Tennis played indoors in a court or room, a plan of which is given. The court nearly fills an entire building, which is lighted from the roof. The playing space is 96 by 32 feet, and is surrounded on three sides by a corridor (*a, a, a*) about 6 feet wide, called the Penthouse, with a sloping roof about 7 feet high. The part of the Penthouse at the rear of the court is called the Dedans, and is occupied by spectators. It is separated from the court by an open grating, *c c*, while the rest of the Penthouse is closed, except for spaces at *b b*, through which the court is entered, and for six small square windows—three in each court. The floor of the court is of smooth asphalt, and the walls are covered with cement and painted black to the height of 18 feet. Across the middle of the court is stretched a net; the space on one side of it is called the Service side, that on the other the Hazard side. On that wall of the Hazard court at *d* there is a projection like a chimney, called the Tambour, and in the Penthouse near it, at *g*, there is a square opening called the Grille. Part of the courts is divided into spaces called Chases, as shown in the figure, which are numbered on the wall from 1 to 6. The server stands in the Service court and serves the ball on the wall over the Penthouse at *g*. The ball must strike on the Penthouse roof, and then roll off into the receiving court. The player in the Hazard court strikes it on the bound where he likes, so long as it first strikes the ground on the opposite side of the net. Thus, he may strike it against the nearest wall so that it bounds back across the net. The scoring is as in Lawn Tennis, except that the server may win a point by sending the ball into a "winning opening"—that is, the Grille, or the window in the Penthouse nearest the end wall.

If a player fail to strike the ball before the second bound, then, except on the hazard side beyond the service line, a "chase" is said to be made. Note is taken of the cross line at which the ball bounded; but if only one chase is made it does not affect the score till one of the players scores forty, when they change sides and "play for the chase." The player who allowed the chase to be made tries to return the ball nearer to the end wall than the point at which it was marked, in such a way that it will bound a second time. As often as his opponent returns the ball he tries again until he either succeeds or misses. If he succeed, he is said to "win the chase" and scores the strike; if not, it is given to his adversary. The ball need not be returned if it fall "worse" than the marked chase—that is, nearer the net on either side—in which case the chase is lost without farther play. Whenever two chases are marked, the players change sides and play for them at once. In playing for chases, as in other play, he who sends the ball into a "winning opening" gains the stroke.

History. Tennis is said by some to be derived from one of the Roman ball games introduced into Gaul by Roman soldiers. It was much played in Europe in the Middle Ages, at first by kings and nobles, but it soon became popular with the common-people. It was introduced into England early in the 13th century. From being an open-air sport it came to be played in closed courts, probably at first the court of a castle or monastery, whence the irregular shape of the present court had its origin. In early times the ball was struck with the hand, and the French still call the game *Jeu de Paume* (the Palm Game). Afterward the hand was provided with a glove, as is still done in the Basque country. On the glove

strings were then stretched, and then the racket was invented. At one time it was not uncommon for one player to use his hand, while his opponent had a racket. The outdoor form, which was the earlier, as has been said, continued to be played in various ways, but the present variety, as played here and in England, was introduced in England about 1874. It is claimed that it was invented by Major Walter Wingfield, of the British army, who attempted unsuccessfully to take out a patent for it in that year. His court was divided on one side into two squares, while on the other the server stood in a diamond-shaped space.

Lawn Tennis soon became popular, and generally took the place of Croquet, which preceded it. In 1881 a National Lawn Tennis Association was formed by the chief clubs in this country, which has since given a tournament every summer, usually at Newport.

The origin of the word Tennis is not certainly known. Some writers say it is from the French *tenez*! (look out!) which they suppose to have been the exclamation of early players when the ball was served. Other suggest that it is from the Latin *tania* (a band), for the mark or line over which the balls are served. The word was first printed in English in Gower's "Ballade to King Henry IV." (1561), where it is spelled "Tennes" and accented on the last syllable; but there were many other ways of spelling it, such as Tenise and Teneys. The word racket (French *raquette*) is said by some to be from the Latin *retis* (net), by others from the Dutch *racken* (to stretch), and by others from the Low Latin *racha* (the wrist), from the old manner of hitting the balls with the hand or wrist. The French outdoor tennis is called *Longue Paume* (Long Tennis), and is played over a low stretched cord instead of a net. The indoor game is called *Courte Paume* (Short Tennis).

Tennis lost its popularity in France during the Revolution, because it was played so much by the nobility.

The peculiar method of scoring in Tennis had its origin thus: In France the "chases" were numbered up to fourteen; so when the first stroke was won the marker called out "Fifteen," for a lower number would mean that the ball had made a second bound at the corresponding chase. A stroke thus came to be called *Un Quinze* (a Fifteen), so that two strokes naturally scored thirty, and three strokes forty-five. The "five" was subsequently omitted from the last number. The term Deuce is from the French *à deux* (equal).

When the doors of the National Assembly were closed by the King of France just before the Revolution, the members met on June 20, 1789, in a Tennis court in Versailles, and swore that France should have a constitution. This oath is known in history as *le serment du Jeu de Paume* (the Tennis oath).

Badminton. A kind of Lawn Tennis in which shuttlecocks (see BATTLEDORE) are used instead of balls. It may be played in a parlor, or in the open air, by two, four, six, or even more players, divided into two opposing sides. The court may be of various sizes, but the best is 28 feet long by 20 broad, the service line being 10 feet from the base line. The net, which is only a foot deep, is suspended $5\frac{1}{2}$ feet above the ground. The rackets used are the same as in Lawn Tennis. The shuttlecocks are usually loaded with lead or rubber, and are sometimes made so that they may be tightened by interlaced strings. The game is played like Lawn Tennis, except that, as shuttlecocks cannot bound, they must always be "volleyed," and when one falls to the ground it counts against the player missing it. Badminton is named from the country-seat of the Duke of Beaufort, in England.

TENT PEGGING. See MUMBLE-THE-PEG.

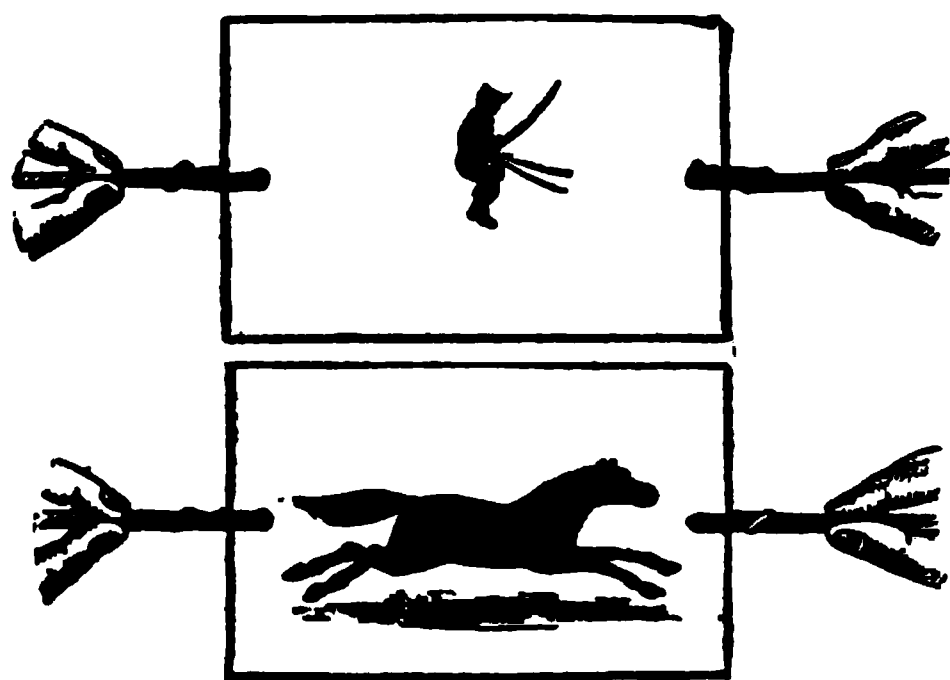
THAUMATROPE. A toy consisting of a square or a disk of pasteboard having pictures on both sides. The disk has strings, by which it can be twirled so rapidly that the eye can see the pictures on both sides at once. This is possible because the image of anything seen remains in the eye about one-eighth of a second, and as it does not take so long as that for the disk to turn around, the images of both sides are in the eye at the same time. Parts of a figure may be represented on one side of the disk and the rest on the other in such a way that when the disk is twirled the figure is seen complete. Thus, the man in the illustration will appear to be riding the horse.

Drawing Thaumatrope Figures. The simplest figures to draw are those whose parts do not have to fit together very exactly. For instance, a cage may be drawn on one side and a bird on the other, and when the disk is twirled the bird will appear in the cage, but its position does not matter much. The figure on the opposite side of the disk from the spectator must be upside down, so that when it turns over to his own side it will be upright. In the case of parts of figures which must fit together exactly more care is required, as for instance when some of a man's limbs are drawn on one side of the disk and the rest on the other. The required figure should be selected from a book, or drawn entire on a sheet of paper, and then the parts to be drawn on each side of the disk must be traced on separate pieces of tracing paper.

Two straight lines, A B and C D, must be drawn across the picture, and their traces lightly penciled across both the partial drawings. One of the partial drawings is now pasted on one side of a piece of pasteboard and pinholes are pricked through it at A, B, C, and D, or

points near them on the lines; the other partial drawing must be pasted on the other side of the pasteboard upside down, but so that the lines A B and C D join the pinholes made from the other side. Thus the two

not be wasted if a mistake is made in pasting. The middle strings must be fastened at the ends of the line A B, and the others, if there are more than one, at equal distances above and below, so that the card



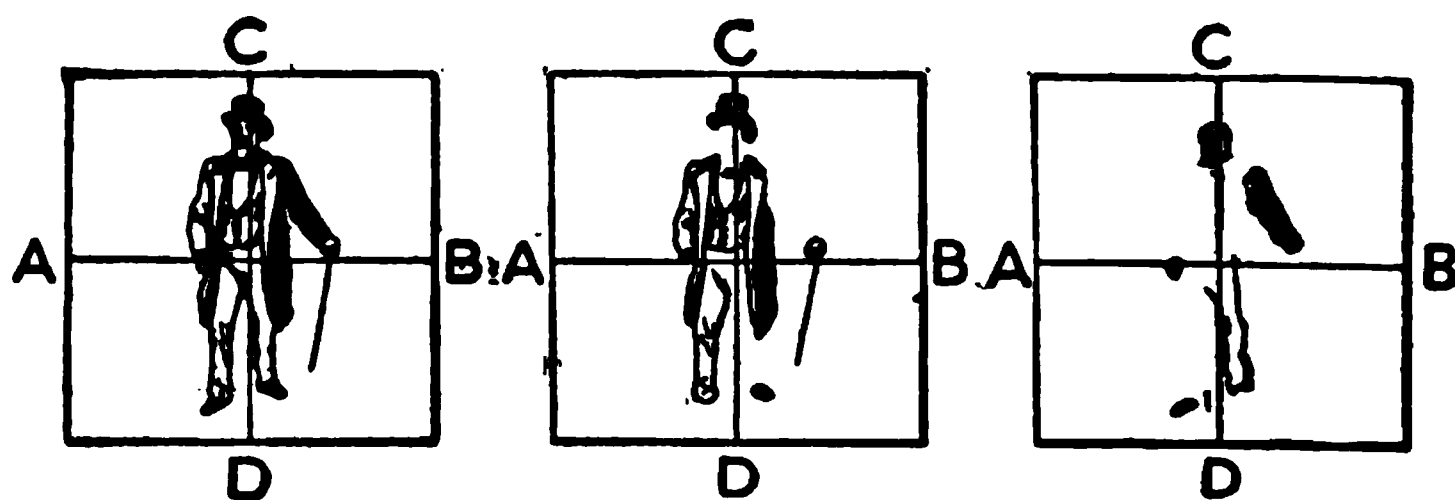
Thaumatropes.

will twirl about this line; otherwise the figures will not blend correctly. It does not matter how the lines A B and C D are drawn in the first place so long as they cross, but their position must be traced exactly on the partial drawings.

Many comical effects can be produced by the Thaumatrope. A man may be drawn on one side and a bottle on the other so that the man will appear to be drinking when the disk is twirled. In the same way

partial pictures will exactly correspond in position. The pasteboard is now cut into any convenient shape—a disk is best, but not necessary—and the figures may be painted or details added to suit the maker. It is best to put only outlines on the tracing paper, so that the work will

can be shown a house, and the same house in flames; a sleeping man, and the same man attacked by rats, and countless other designs. If the axis on which the card twirls is changed a little, the position of the figures changes. This can be effected by using two strings only on



Drawing Thaumatrope Figures.

each side, and having one of these on one side made of stiff elastic. When the string is pulled, the axis of the card will change, and with it the relation of the figures. Thus, in the case of the man drinking, the hand may appear

slightly raised at first, and, on tightening the string, may be visibly lifted to the mouth.

THEATRICALS. See PRIVATE THEATRICALS.

THREE-FACED PICTURES. Pictures which will appear differently,

according as they are viewed from the right, the left, or directly in front. They can be made as follows: Select any three pictures of

Fig. 1.

exactly the same size, on paper of the same thickness. Cut them into vertical strips about one-third of an inch wide, numbering the strips in each case so that their relative places may be remembered. Then paste the strips on to thin paper; first the three strips numbered one, then those numbered two, and so on. The result will be a confused picture as wide as all the three original pictures together and of the

Fig. 2.

same height as one of them. (See Fig. 1, where the three kinds of strips are lettered a, b, and c, respectively). This is then folded up like an accordion or fan (Fig. 2), every third strip, c, remaining flat,

while the others are pushed together. The latter are now pasted firmly to one another, so that the picture seems to be divided vertically by fences or partitions of paper. The whole may now be mounted on pasteboard and will show one or the other of the three pictures, according to the point from which it is viewed.

THIRTY-ONE. A game of cards played with a full pack, by any number of persons not exceeding sixteen. Three cards are dealt to each, and three more are placed, face upward, in the middle of the table. Each player, in turn, exchanges one of his cards for one in the spare hand, until some one is ready to show his hand, or stops changing. The highest hand is one containing cards all of the same suit, the sum of whose pips is 31 (reckoning Ace as 11, and face cards as 10 each). Next in rank are three cards of a kind (three Kings being highest and three Aces lowest), and after that, in order, hands all of the same suit, the sum of whose pips is less than 31. When any one has 31 he shows his hand at once, and wins the game. When any one cannot better his hand by exchanging, and still has not 31, he announces the fact, and then the others, in turn, can each exchange once more, after which all show their hands, and the highest wins.

Another way of playing is to keep the score with counters, each player being given two or three at the beginning. He who has the lowest hand puts one in the centre of the table, and the game goes on till only one has any counters left. That one is then declared the winner.

THREAD THE NEEDLE. A game played by any number of persons, who join hands to form a line. The player at one end, whom we will call A, and the one at the other end, whom we will call B, begin the game by a dialogue in verse as follows:

- A. "How many miles to Babylon?"
 B. "Threescore miles and ten."
 A. "Can I get there by candle-light?"
 B. "Oh yes, and back again."
 A. "Then open the gates as high as the sky.
 And let King George and his train pass by."

B and the player next him then lift their joined hands as high as possible, and A, with the others behind him, pass under. This is then repeated, B becoming the inquirer and threading the needle in his turn.

History. The game is an old one, and the verse is said in many different ways, one variation of the last two lines being:

- "Then open the gates without more ado,
 And let the King and his men pass through."

The verse is sometimes used also in a game like PEELAWAY, when it ends:

- "Yes, if your legs are long as light,
 But take care of the old gray witch by the hillside."

Threading Grandmother's Needle. A form of the game in which the dialogue is between the two on one end and the others. It is as follows:

- "Grandmother's eyes are grown so dim
 Her needle she can't fill."

- "Our eyes are very bright and good;
 Thread it for her we will."

THREE ELEMENTS, THE; or, FISH, FLESH, AND FOWL. A game played by any number of persons, who sit in a circle. One of them, who is chosen in any way the company pleases, stands in the middle, holding in his hand a handkerchief or soft ball. This he throws suddenly at any one of the players, crying out one of the three words Earth, Air, or Water, and then counting ten. If the player whom the ball strikes cannot speak the name of some creature that lives on or in the element named, before the other has finished counting, he must pay a FORFEIT and take the place of the one in the middle of the circle. Otherwise the player in the middle of the circle must throw the ball at some one else.

Sometimes the words Fish, Flesh, and Fowl are used, instead of the names of the elements. If desired, the forfeits may be omitted.

RULES OF THE GAME.

1. The name of the element may be spoken as soon as the ball is thrown, but the counting may not begin till it strikes the player.

2. In counting, every word must be pronounced clearly.

3. In case of doubt as to whether the name of the creature has been spoken before the counting is finished, a majority of the players shall decide.

4. All birds shall be considered to live in the air.

5. Amphibious animals may be regarded as living either in water or on the earth.

THREE KINGDOMS, THE. See TWENTY QUESTIONS.

THREE LIVES. A word game played by any number of persons. The first player thinks of a word and gives its first letter. The second thinks of one beginning with that letter and gives the second letter. The third thinks of one beginning with these two letters and gives the third. This goes on till some one is unable to think of a word beginning with all the letters given, or till some one's letter finishes a word of four or more letters. In either of these cases the player is said to "lose a life," and the one next in order begins a new word. When any one has lost three lives he drops out of the game, and the victor is he who remains in at the last. Thus, suppose the first player thinks of "House," and says "H." The second thinks of "Happy" and says "A." The third thinks of "Harness" and says "R." The fourth thinks of "Harpy," but cannot say "P" because that completes the word "Harp," so he thinks of "Harlem" and says "L." The fifth is unable to think of any word beginning with "Harl," and

so loses a life. When only two or three are left in the game it becomes more exciting, each one trying to give the word such a turn that the next will either not be able to go on with it, or will be forced to complete it. When a player cannot go on, and has thus lost a life, he may require from any one before him to tell what his word was; otherwise a player might merely add a letter without thinking of any word at all.

THREE THINGS. A game played by any number of persons sitting in a row or circle. The one who begins gives to his left-hand neighbor the names of three things beginning with the same letter, which the latter must then connect in some way, and then give three other things to the next in the line. When any one is unable to connect the names he receives he must pay a forfeit, and the names are passed along to the next player. Thus, the first player gives out "Hen, Ham, and Heaviness." The second says: "The hen tried to eat the ham, and found that heaviness in the crop resulted. I give Door, Dinner, and Duty." The third says: "I opened the door to go in to dinner, when I had to go back to fulfill a forgotten duty," and so on.

THROW THE HANDKERCHIEF. A game played by any number of persons, who sit in a circle. One stands in the centre and begins the game by throwing a handkerchief at some one in the circle, who at once throws it at some one else, and so on. If the one in the centre can touch a player who is holding the handkerchief, or can catch it when thrown by any player, such player must take his place. A large towel is often used instead of a handkerchief. It should not be tied in a knot, but allowed to spread out when thrown, as this increases the difficulty of throwing, and the fun of the game.

THROWING LIGHT. A guessing

game played by any number of persons. Two of the players privately agree on some object, and then converse about it without naming it, trying to mystify the rest of the company. This is called "Throwing light" on the object chosen. As soon as one of the others thinks he has guessed it, he joins in the conversation, and aids in throwing light. If one of the original players thinks, from what he says, that the guess is not correct, he says "I challenge you," and the guess must be whispered in his ear. If it is incorrect, the guesser must sit with a handkerchief over his face till he is able to "throw light" correctly. The game goes on thus till only one of the players is left in the dark. It is allowable to choose two words of the same sound but different meanings, as in HOW DO YOU LIKE IT? and use either meaning at pleasure, so as to make "throwing light" more difficult.

THUS SAYS THE GRAND MUFTI. See GRAND MUFTI.

TIDDLEY WINKS. A game played by any number of persons, singly or as partners, on a table covered with a thick cloth. Each player is provided with a set of six small counters and one large one, all of the same color, the different players having different colored sets. A little basket or cup, generally of ivory or celluloid, is placed in the centre of the table, and each player ranges his small counters in front of him in a line about eight inches from it. The object of the game is to snap each of the smaller counters, by pressing on its edge with the larger one, so as to make it jump into the basket, and he wins who first gets all his counters in. The players take turns, but he who is successful in snapping a counter into the basket has the privilege of playing until he fails. After a player has played out all his counters from the starting line, he can play, when his turn comes,

any of his counters wherever it may lie; but he is not allowed to touch any of his adversary's counters, and if any of his own be covered, and no other be available, he must wait until his adversary has uncovered one before he can play. A player may not intentionally cover any of his opponents' counters. If a counter fall off the table, it must be replaced one inch from the edge where it fell off. Partners sit opposite each other, and may play each other's counters after they have left the starting line.

Variations. The game may be played with several variations by marking, around the basket on the cloth with French chalk, a ring about four inches in diameter.

1. Any counter falling within this ring is to be considered dead, the winner being he who gets most counters into the basket.

2. Any counter falling within the ring must be returned to its place in the starting line, and played out by the player at his next turn.

3. If a counter fall within the ring, the next or any other player during that round, is at liberty, if he choose, to play it (instead of his own) to any part of the table he may consider best for himself. If it be not played thus, the player to whom it belongs can play with it at his next turn in the usual way.

4. Mark on the cloth any figure, such as a circle, a square, etc., and divide it into numbered segments or parts. Several games may be played with these, the counters scoring according to the number of the part they fall in.

Tiddledy Winks may be played also as a PROGRESSIVE GAME, on any number of tables.

TIERCE. See FOX AND GEESE, II.

TIN, Experiments with. Tin is described in C. C. T. 1. Take an ordinary piece of tin-plate and hold it over the flame of an alcohol

lamp till the tin begins to melt; then thrust it into cold water. This will harden it. Rub the surface first with a piece of paper wet with a mixture of weak nitric and hydrochloric acids, and then with one wet with caustic soda dissolved in water. The surface of the tin will then be seen to be formed of crystals like frost on a window-pane.

2. Place some metallic tin (not tin-plate) on a playing card and hold it over the flame of a spirit lamp. The tin can be thus melted without burning the card (see illustration). The reason is that the

Melting Tin on a Card.

metal conducts heat so well that it leads the heat away from the card before the latter has time to burn.

TIP. A game played by any number of persons. A pile of favors is placed on a table, consisting of parcels of candy or any desired articles, and each takes his turn at selecting from them. Before doing so, the player turns his head while some one touches any one of the articles. This is called the Tip, and the player may select and keep any favor he pleases till he touches the Tip, when the turn passes to the next. As all know what the Tip is except the one selecting, his choice affords much amusement to the company.

This game is popular in Germany, and is appropriate for children's parties.

TIP-CAT. See CAT.

TISSUE PAPER, Experiment with. Make a cylinder of tissue paper four or five inches high and two or three inches in diameter, and, standing it upright on a table, set it on fire from above. It will turn to cinder as it burns, and the cylinder will bend inward above to form a sort of dome, which the hot air underneath, when it has been nearly consumed, will carry up into the air five or six feet. This experiment often has to be tried several times before it succeeds, but when it does it is very striking. The mass of light cinder really forms a small hot-air balloon, like those described under **FOURTH OF JULY**.

TIT-TAT-TO, or NOUGHTS AND CROSSES. A game played by two persons on a slate, or with pencil and paper. A figure is first marked on the slate, or paper, like the one in Fig. 1, but without the numbers, which are here only for convenience of reference. The players take turns in putting marks in the

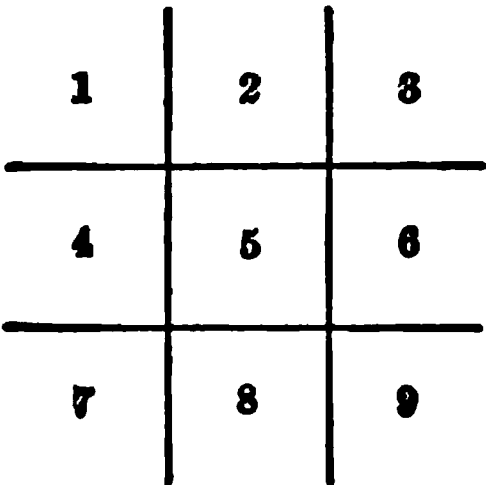


Fig. 1.—Tit-tat-to.

places numbered in the illustration, and each tries to get three of his own marks in a row, and to prevent his opponent from doing so. One player usually chooses an x for his mark and the other an o. The following game should be played out on paper. The numbers refer to the first illustration.

x 1
o 5
x 2
o 3
x 7
o 4
x 8
o 6

The x's and o's are now are ranged as in Fig. 2, and the o's have won. The winner points to his row of three and says, "Tit, tat, to; three in a row." In the above

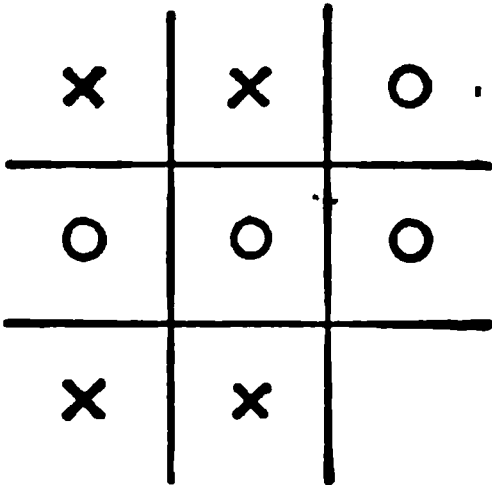


Fig. 2.—Tit-tat-to.

game the player who chose x for his mark made a mistake in his last play. If he had put his mark on 6 instead of on 8, he would have prevented his opponent from making a row. The game is so simple that with two skillful players it always ends in a draw; that is, neither gets a row of three.

Tit-tat-to resembles **NINE MEN'S MORRIS**, and they may be derived from the same game. The ancient Romans played a game somewhat

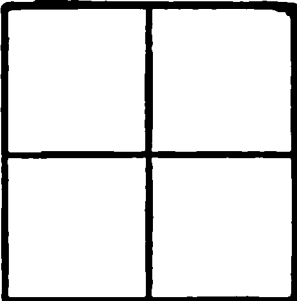


Fig. 3.—Mühlen-spiel.

like it, as we learn from a passage in Ovid's "Art of Love." In Ireland the game is called Tip Top Castle. The game of **GO BANG** also seems to be a form of it.

In Germany the game is called *Mühlenspiel* (The Mill Game), and played with pebbles or grains of corn on a diagram like Fig. 3.

The pebbles can be placed on any of the nine places where lines meet, and whoever first gets three in a row says "*Trip, trap, troll; meine mühle ist voll*" (Trip, trap, troll; my mill is full). NINE MEN'S MORRIS is called by the Germans *Doppelmühle* (Double-Mill).

TIVOLI. See BAGATELLE.

TOAD, THE. A SOLITAIRE game of CARDS, played with two packs. The first thirteen cards are placed, as they appear, in one pile, called

the Toad. The rest of the pack is arranged in five piles, in any order the player wishes. As the Aces appear they are placed in a row, and on them families are built upward, without following suit. The top card of any of the piles may be used for this purpose. The player will try, of course, to arrange the piles in the best order for building, in the cases where it is allowed. Success depends on the order in which the cards fall in the Toad.



Toboggan.

TOBOGGANING. Coasting on toboggans, or sleds without run-

ners. to one-quarter of an inch thick, and vary in length from four to eight feet, and in breadth from sixteen to twenty-four inches. Across the upper side ribs or cleats of wood are fastened to give them strength, and along the side are hand-rails, to which the coasters may cling, and to which cushions are often strapped. The front is bent backward in a curve to form a sort of dashboard. The slides on which toboggans are used are either natural or artificial. In this country the latter are most common. Natural slides are apt to be uneven, and contain little mounds, called in Canada *cahots*, which make the toboggan leap into the air and cause accidents. The artificial slides are frameworks of timber supporting a slideway of boards which is covered with snow and ice. The highest point may be forty or fifty feet above the ground. These slides are often built on the side of a hill, where part of the descent is natural. There are also double slides, consisting of two slides side by side, but with the incline in opposite directions, so that after descending one the coaster has only to ascend

Manner of holding Toboggan.

ners. Toboggans are made of tough elastic wood from one-eighth

a flight of steps to be at the top of the other slide. At the top of the slide is a starting platform, and leading from this are *chutes*, or flat-bottomed troughs, in which the toboggan runs. There may be several of these, each from four to six feet wide, with raised side-boards to keep the toboggan on the chute. Below the chutes is generally a natural slide with a very slight inclination, and sometimes hay is placed at the bottom, to stop the toboggans. On one side of the slides is a flight of steps, and by its side a dragway on which the toboggans are drawn up.

The plan shows how such a slide is built. The chutes are packed with snow, or sometimes with a mixture of snow and sawdust mixed with water and allowed to freeze. If the packing is done properly, the surface should be perfectly smooth, and the toboggans will attain great speed—often as great as a mile a minute. The makers of one kind of toboggan have advertised that with their toboggan a speed of three miles per minute may be reached. Yet, on properly built slides toboggans are safer than ordinary sleds, for they cannot leave the chute; and as they have no runners and are close to the ground, they rarely upset.

Steering. The toboggan is guided either by short sticks of wood in the hands or with the foot. The right foot is generally used, and the steerer kneels or lies on his side. The principle is the same as that by which a sled is steered. By touching the ground with the bit of wood or the foot on one side, that side is made to go slower and the toboggan turns in that direction. A toboggan is easier to steer than a sled. On some slides steering with bits of wood is forbidden, as it tears up the surface.

The toboggans made in Canada are commonly of one piece of

wood, with a smooth flat bottom. Toboggans are made in the United States of slats rounded on the bottom, so that each is a sort of low

Plan of Slide.

runner. Some toboggans are shod with steel. The rail at the side is often made to yield to the motion of the toboggan, so that it bends easily. The screws that fasten it should not appear on the bottom,

for if they project they increase the friction and tear the ice on the slide; and if they are sunk into the wood, the snow collects in the holes and roughens the bottom.

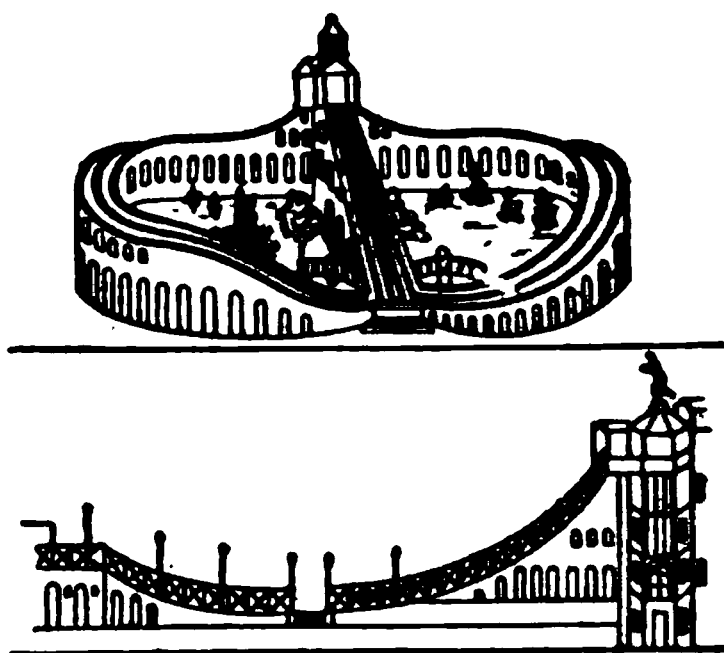
Toboggan Yachts. Snow yachts have been built and sailed on the prairies of the great West. They are shaped and rigged like ICE-BOATS, but have toboggans instead of runners, the rear, or steering toboggan, being only six inches wide. One of these toboggan boats is thirty-two feet long and fourteen feet beam, has a mast twenty feet high and a boom twenty-two feet long. She is sloop-rigged, and is said to have made forty miles an hour. Snow yachts cannot sail close to the wind. (See SAILING.) When they wish to "go about," they do so by "wearing."

Water Toboggan. A toboggan used by bathers. The slide is covered with little rollers, over which the toboggan glides easily, and it ends in the water. The coasters, clad in bathing suits, shoot down the slide with great velocity and over the surface of the water for many rods. When the force of the toboggan is spent, it is allowed to sink, and the coaster swims to the shore. The toboggan is recovered by a string attached to it. One of these slides is at Fort Hamilton, on New York Bay.

History. The word toboggan is a corruption of the Indian *odabagan*. Toboggans were used by the northern Indians, before the discovery of this continent, for the transportation of game, furs, and other goods. They were drawn either by dogs or by men, and were well adapted for travelling on the deep snow. They were originally fastened together entirely with deer-thongs, but now metal rivets or screws are used.

During the French and Indian wars and in the Revolution toboggans were used for transporting military stores and equipments in

northern campaigns. About 1835 British officers in Montreal introduced tobogganing as a sport by coasting down Mount Royal. The sport grew quickly in popularity, and the artificial slide, which had long been in use in Russia, was



Russian Slide.

soon introduced. In this country, tobogganing was first practised in northern New England near the Canadian boundary, but within a few years it has been popular in other regions. In 1884 a large slide was erected in Saratoga, New York; and since then others have been built in various parts of the United States. At the "winter carnivals" in St. Paul, Minnesota, Burlington, Vermont, and other cities—in imitation of the one held annually in Montreal, Canada—tobogganing is one of the favorite sports, and there are parades of the members of toboggan clubs, clad in gayly-colored uniforms.

TOM TIDDLER'S GROUND. See TAG.

TOOTHPICK BOMB. A toy made by interlacing four wooden toothpicks. Place three in the form of a triangle, so that the end of each rests on that of the next. Now push them together as far as possible, and lock them by weaving in a fourth under one pick, over the next, and under the third. This can be done after a few trials. Lay

the bomb on a plate, with one end projecting over the edge, and light that end with a match. When the end has burned down to the place where two picks cross, they will be released and their spring will throw all the toothpicks into the air.

TOPS. See the article in C. C. T. **String Tops.** The string is wound sometimes around the body of the top, which is grooved for the purpose, or around an upright peg at the upper end. The former kind is spun by being thrown on the ground, while the end of the string, ending in a loop or button, is retained in the hand. The cuts show the way of holding in England and this country. As the top



English Manner of Holding Top.

moves through the air the string unwinds, giving it a whirling motion which keeps up after it has struck the ground. Other tops have generally a handle by which the top is held in one hand while the string is pulled by the other. The handle is loose enough to allow the top to whirl as the string unwinds, and is either withdrawn when the top is set going or remains on the top as it spins. Some



American Manner of Holding Top.

tops can be set going in the air and then placed on the floor.

Whip Tops are set in motion by twirling with the fingers, and then

the whirling is increased and kept up by whipping the top with a piece of cord, usually fastened to a whip handle. This requires some

Whip Top.

skill. An eel-skin is said to make the best whip, as it is soft and clings to the top when it strikes it.

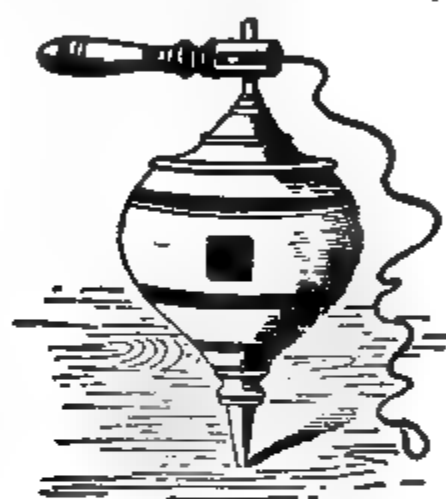
Spring Tops have a handle or cap, fitted over the upper end, which is held in one hand while the top is turned round by the other. This winds up a spring in the handle, which, when the top is placed on the floor, is set loose, and, unwinding, spins the top, when the handle is then pulled off. Spring tops are apt to get out of order, and are not much used.

Teetotums. Little tops called teetotums are spun by twirling them with the fingers. They have usually from four to eight flat sides or edges, on each of which is a letter or number. Teetotums are used in playing several games, to determine the moves, each player twirling the teetotum in turn and playing according to the letter or number that is uppermost after the top has fallen on its side.

Humming Tops are made hollow, with a hole in one side, past which the air rushes as they spin, making the air within vibrate and causing a humming sound. (C. C. T.) Some humming tops are fitted with one or more reeds, or vibrating tongues of metal, like those that make the sounds in a parlor organ, and they thus give a distinct musical note,

sometimes a whole chord. They are sometimes arranged so that the note changes as they spin faster or slower.

A humming top may be made from an ordinary cylindrical baking-powder or spice box. Make a hole exactly in the middle of cover and bottom, and push a lead pencil through the box, the point projecting about half an inch. Lift the cover slightly and with a strong pair of scissors cut a slit in the box about two inches long and one-eighth of an inch wide. Replace



Humming Top.

the cover, and the top is complete. If the lid does not fit tight it should be fastened on with glue. It is spun by means of a handle made of a piece of lath three or four inches long with a hole in one end large enough to admit the lead pencil freely. The string is wound on the pencil above the box, the hole in the handle is placed over the pencil, the end of the string is brought up through the hole, and the string is then pulled with one hand while the handle is held in the other. These tops are often made by boys in France.

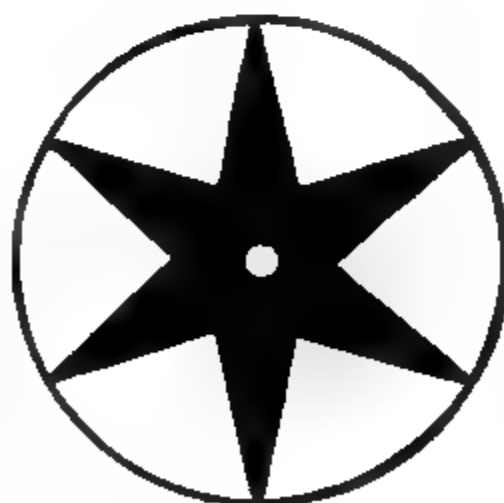
Color Tops or Chameleon Tops. Tops bearing a flat disk or plate painted in various colors. When the top is spun, these colors appear blended or mixed together. A loose circle of paper or leather, with part cut away, is placed on



Color Top.

the disk, and may be pushed around so as to expose different colors. When the top is spinning,

Design for Color Top.—Fig. 1.



Design for Color Top.—Fig. 2.

if this piece be touched, it will move, and the exposed colors will be different, so that the top will seem to change its color. Rings

of colored paper and various designs like those shown in the illustration can also be dropped on the disk and made to overlap in vari-

be placed on a spinning color top, the central hole being larger than the handle of the top, it will gyrate on being touched, and the holes will appear like a delicate lace-pattern, changing with each touch. If shining steel buttons be glued to the top of the disk, the appearance on spinning will be still more beautiful.

French Top. A case in which are packed a number of small tops shaped something like saucers. The case and its contents are set spinning in the usual way, and

Appearance of the Spinning Wires.

ous ways, which also changes the color of the spinning top. Color tops usually have a hole in the top of the stem, into which bits of wire of various shapes can be put. When the top is spinning, these wires whirl round so rapidly that they look like glass vessels or dishes. They are best seen against a black background. Color tops are usually spun in little glazed saucers, so that they keep their motion for a long time.

If a disk with rows of holes in it



French Top.

then, holding it by a loose handle, the spinner shakes the case, and the tops within fall out one by one and continue to spin on the floor

Dutch Rackets.

Dutch Rackets. A game played with a top and a racket, D (see illustration), about the size of that used in LAWN TENNIS, which, in-

stead of being strung, is made entirely of wood, one side being slightly hollowed and the other fitted with little cups, each of which

is marked with a different number. The top B is spun on the hollowed side of the racket by the string C, pulled through the standard A, and the player then tosses it into the air, turns the racket over, and catches the top in the cups in succession, till it falls to the ground or stops spinning, scoring each time the number marked in the cup in which he catches it. The screw E is for tightening the racket.

Flying Top. A toy consisting of a stick to which are fastened three



Flying Top.

vanes with oblique surfaces. The string is wound around the stick or spindle, which is then placed in a stand. The end of the string is passed through a hole in the side of the stand, and being pulled causes the top to turn rapidly around. When it has attained sufficient speed it rises high in the air, from the action of the vanes, which work in the same way as the screw propeller of a steamer.

Fly-Fly. A form of flying top in which the force is derived from a twisted rubber band. The flyer or cap holding the vanes turns freely on the spindle, and a thick piece of india-rubber is fastened to the flyer at one end, and at the other to the spindle. If the spindle be held firmly in one hand and the flyer turned with the other, the rubber will be twisted, and when re-

leased it untwists, turning the flyer, which propels the Fly-Fly through the air. (Figs. 1-3.) The height to which it will rise depends on the size of the vanes and the elasticity of the india-rubber band. Fig. 2 is worked by pressing down and pull-

Fly-Fly.—Fig. 1.

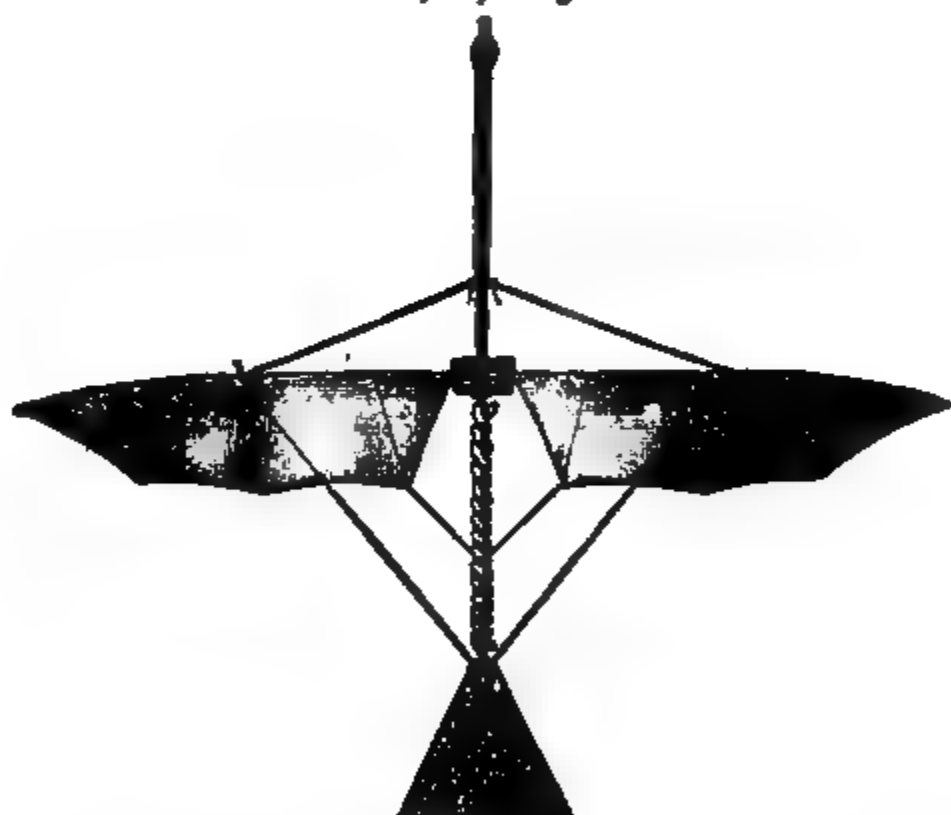
ing up the beam AA, which is guarded by a slot in one of the uprights.

Magnetic Top. A top consisting of a flat disk of iron pierced in the middle by an axle, pointed at one end. When it is spun like any other top and a magnet is presented to it, the top avoids the magnet, being repelled instead of attracted, though it is of iron. When the top is still, however, or spinning very slowly, it is attracted, like any other piece of iron. The reason is that when the top spins fast the magnet induces electric currents in

the iron disk, which really becomes a small dynamo-machine. The effect of these currents is to repel the magnet, and their action is stronger than its attraction for the iron, unless it is spinning slowly. With

a copper top the repulsion is even greater; but the tops are made of iron because it seems stranger that a metal which is usually attracted by a magnet should ever be repelled.

Fly-Fly.—Fig. 2.



Fly-Fly.—Fig. 3.

Travelling Top. A top which rolls instead of spinning. A simple one can be made thus: Cut out a flat circular piece of wood or tin about three inches in diameter and make in the edge two notches exactly opposite each other. Tie together the ends of a piece of strong

twine about three or four feet long and pass it around the legs just above the knees. Twist the string by means of a stick thrust between the strings. When it is twisted, remove the stick and put the disk in its place, the string holding it by the notches on its

edge. Now release the disk and force the cord to untwist swiftly by pulling the knees apart. The string will make the disk revolve with it till it has untwisted.

How Tops Spin. When not in motion, a top cannot be made to stand on its point, but when it is spinning it does so easily. The reason is that every part of the top is then moving around with great force, and when the top tips a little to one side, so that the part on that side tends to fall toward the ground, that part of the top is whirled around quickly to the other side and another part takes its place. The falling motion is therefore turned to one side, and instead of tipping over the top merely gyrates; that is, the stem moves around in a circle. This is hardly noticeable when the top is spinning very fast, but as the rubbing of the point against the floor stops it gradually, it gyrates more and more, and finally touches the ground. But tops which gyrate or "wobble" when they begin to spin, usually become quiet in a few seconds, and remain so as long as they are spinning fast. They are then said to "sleep." The motion of a top has been studied by many learned men, and requires mathematics to explain it completely. The earth spins in its course like a great top, and it also gyrates like one, but very slowly, the North Pole taking more than 25,000 years to describe one of its circles.

The Romans called the top *buxum*, the name of the box tree, because they used that kind of wood in making it. It is alluded to by the Latin poets as a children's toy, and has been a favorite with all nations.

TOURMALINE, Experiments with. Slices of the mineral called tourmaline can be bought of an optician. If one slice be held in the left hand and another in the right, and if the latter be slowly turned

around, while the experimenter looks through them at the sky, it will be found that there is one position where it is impossible to

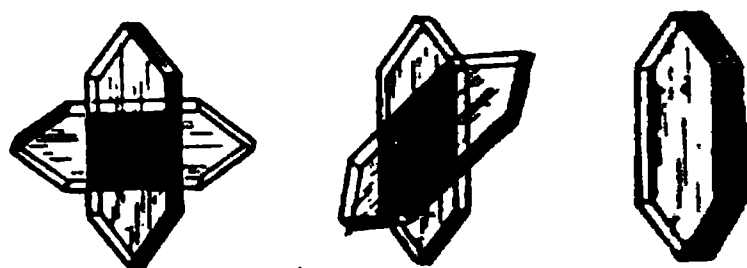


Fig. 1.

see through them. (See Fig. 1.) Looking through them at a card pierced with a hole and placed between the experimenter and the light, he will find that as he turns one tourmaline quite around, the hole will disappear and reappear again twice. While they are in the position where the hole cannot be seen, let some one hold a very thin piece of mica between them. The hole will at once become visible, and if the tourmaline nearest the eye be turned, beautiful colors will be seen, changing one into another. The light, after it has passed through the first tourmaline, is said to be polarized. Most reflected light is also partially polarized, as may be seen by looking through one tourmaline at the light reflected from glass, polished furniture, water, or even from the sky. When the tourmaline is turned, the light will grow brighter and dimmer by turns, though it will not disappear entirely. If a piece of mica be held between, as before, the same colors will be seen. An arrangement for polarizing light by reflection may be made by laying on a board a piece of glass painted black on the under side, and supporting on one side of it the tourmaline, mounted in a cork which fits in a hole in an upright bit of wood. The hole must be bored diagonally, so that the cork makes an angle of about 55 degrees with the flat glass. This particular angle is the best, but it is not necessary to be exact. Place

the arrangement in front of a window where the light from the sky can be reflected from the black glass and then observed through the tourmaline. The latter can be



Fig. 2.

turned by turning the cork in the hole. On doing so, it will be seen that the light reflected from the black glass is well polarized. Examine a number of transparent objects by placing them just below the tourmaline, and it will be seen that some show colors and some do not. CRYSTALS of different substances deposited on glass should be tried, also pieces of glass. Instead of a tourmaline, an arrangement of crystals called a Nicol prism may be used. This is still better, as it allows more light to pass. It can be bought of any dealer in scientific apparatus.

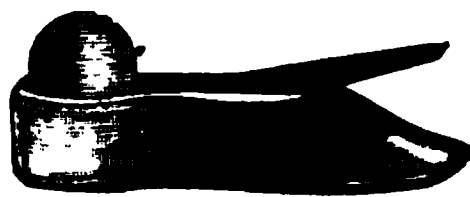
Glass shows the prettiest colors and figures when it is in a state of strain from uneven cooling. To prepare it, take pieces a quarter of an inch thick and about an inch or an inch and a half square, and heat them red hot on a piece of slate in a coal fire, or over a Bunsen burner. Let them cool on a piece of cold iron. They will not break if they have been heated enough. Instead of the tourmaline or Nicol prism, the following arrangement may be employed. (See Fig. 2.) Bore a hole lengthwise through a cork about an inch and a half long, and then cut it in two diagonally, making an angle of about 34 degrees with the axis, as shown in the picture. Glue to the diagonal surface of the lower half of the cork six plates of very thin glass, separating them by tissue paper glued at their edges. Then glue on the upper half of the cork, so that the round hole in it seems continuous with that in the lower half. Two of these arrangements may be used instead of the

two tourmalines, or one may be used with the apparatus for polarizing by reflection.

Objects can be made of thin sheets of mica, which show beautiful colors when examined by polarized light. Among these are a piece bent into a half cylinder, held in place by strips of gummed paper; two such half cylinders, crossed; a cone, made by cutting a small sector out of a mica circle and then bringing the edges together; a wheel, each of whose spokes is twisted a little, and bars of mica crossed in various ways.

TRADES. A game in which each of the players pretends, in dumb show, to work at some trade—the shoemaker sewing a shoe, the carpenter hammering or sawing, etc. One of the company is chosen as leader, and whenever he drops his trade for that of another player, that player must take up the one that the leader has just left, while all the others stop their motions. Whenever the leader resumes his original trade, the others begin to work at theirs, as at first. Any one who makes a mistake must pay a forfeit.

TRAP BALL. A game played by any number of persons with a trap, bat, and ball. The trap is made of wood, of the size and shape of a low shoe, having in it a spoon-shaped lever, arranged as shown in the illustration. The ball is like a small



Trap and Ball.

base ball, and the bat like a short cricket bat, to be used with one hand. The players divide into two parties, one of which takes position in the field, while those on the other, one by one, take turns at the bat. The batter places the ball in the trap, and by striking the free

end of the lever with his bat sends the ball into the air. He then tries to hit it as far as he can. If he miss his stroke, or strike the ball beyond the side boundaries, or if a fielder catch the ball before it touches the ground, he is out, and the next player takes the bat. Otherwise, the fielder who stops the ball bowls it at the trap, and if he hits it, or the ball stop within a bat's-length of it, the striker is out. If not, the striker estimates the distance of the ball from the trap in bat-lengths, and calls it out. If it be within the actual distance, he scores toward game the number of bat-lengths called; but if it be more than the real distance, he is out. When a player is out, he takes no further part in the game till all his side are out, when the sides change places. Those who do not go out continue to strike and score, in order, till all are out. When each

side has finished its turn at the bat, the game is at an end, and the side with the largest score wins.

Sometimes, instead of the trap, a piece of wood called a Splent is used. A little hole is made in the ground with the bat, the splent is placed with one end in the hole, and the ball is put on that end. When the end of the splent outside of the hole is struck with the bat, the ball rises, as from the trap.

Trap ball is a very old game.



Old English Trap Ball.

The illustration, from an ancient English manuscript, shows a form of it.



Figure Four Trap.

TRAPPING. Catching animals or birds by means of traps or snares. It is not considered honorable to trap wild game that is usually killed by sportsmen with the gun, but troublesome and dangerous animals are properly caught in this way, as well as fur-bearing creatures, like the mink or beaver. The best traps are the common steel traps, to be bought at hardware stores, and which are made of several sizes. An easily made trap is

the Figure Four, so called from its shape. It consists of a heavy stone or log supported by three notched sticks placed as shown in the picture. The separate pieces are shown in Figs. 1, 2 and 3, and the completed trap in Fig. 4. The animal trying to remove the bait from the end of the pointed stick brings the stone down upon him, and is crushed to death. When a log is used, a row of stakes is driven into the ground on each side of it,

and it falls between them. For catching animals alive, there are various forms of traps made of wire or wood. The simplest is a contrivance having a swinging door which will open only inward. The animal pushes up the door to get at the bait, and is unable to push his way out again.

A trap for small burrowing animals, called the Jug-trap, is made by burying a jug or other earthenware vessel, having a hole knocked out of the upper part. A passage is made from the surface to the hole, and the animal entering it falls into the jug and is caught.

TRAVELLER, THE. A game played by any number of persons, one of whom represents a traveller. The others are numbered, and each receives several counters, or bits of paper, bearing his number. The traveller then asks them, in order, for any information he chooses about the places to which he is going. As soon as he is given some that is correct he takes a counter from whoever gives it, and asks the next player a different question. After a specified time, or number of rounds, the traveller examines the counters in his possession, and the player who gave him most information becomes traveller in his turn.

TRIC-TRAC. See BACKGAMMON.

TRICYCLING. See CYCLING.

TRIPLET. A game of cards played by three persons with a full pack and any number of counters, which are divided equally. The dealer—the player who cuts the lowest card (ace being high)—gives two cards to each. Each looks at his cards, and places in the centre of the table a number of counters agreed on beforehand. One more card is then given to each by the dealer, who turns the next card as trump. Any player may now declare that he wishes to win “by hand,” whereupon all must show their hands, and the highest wins.

The three kinds of hands in order from the highest to the lowest are as follows:

1. A Triplet—three cards of a kind. If there are two triplets, the highest wins, but one containing a “special card,” or a face card of trumps, beats any other. The “special cards” are the Three of Trumps, Spades, and Hearts.

2. A Tierce—any three cards in regular order, regardless of suit. If there are two, the highest wins, and one containing a special card, or face card of trumps, always wins.

3. Three of a suit, according to the total number of pips—a special card counting 13, an ace 12, and a court card 11. If one of two otherwise equal hands contains a face card of trumps, it beats the other.

If any one wins by hand there is no playing. If no one declares that he wishes to do so play begins, the eldest hand leading. Suit is not followed. In play, only face cards of the trump suit rank as trumps. No card can be taken by one of the same color unless the latter be a trump. Any card of a common suit, or any plain card of the trump suit, may be taken by a higher card of opposite color; but any card may be taken by a trump face card, and this by a special card. The Threes of Clubs and Diamonds, when not trumps, are the lowest cards in their respective suits. To win in play, a player must take two out of the three tricks. If no one does this, the same dealer deals again from the stock without shuffling anew. He who wins takes all the counters in the middle of the table; but if no one wins, they remain and accumulate.

TRUSSING GAME, THE. A game played by two persons, each of whom tries to overturn the other, after both have been tied or “trussed,” as follows: The player seats himself on the floor; his hands, placed palm to palm, are

bound together at the wrist with a handkerchief, and his legs are tied in like manner above the ankles. The knees are then drawn up, the arms placed over them, and a stick about four feet long pushed over one arm, under both knees, and out again over the other arm. The player can now move no part of his limbs except his toes. If he is overturned the ends of the stick prevent his falling on his side, but he cannot right himself without aid. Two players, "trussed" in this way, are placed opposite each other in the middle of the room, their toes just touching. The object of each is to tip his opponent over by means of his toes, and he who first does this is the winner. If either of the players falls over, he must be placed in position again by the spectators.

It is related that an English gentleman, having captured some thieves in his house at night, with his servants' aid, "trussed" them thus, to secure them until morning, and tipped them over on one side, with such success that the robbers were not able to move from the place where they were left.

This game is called also "Chicken Fight," or "Cock Fight."

TRUTH. A game played by any number of persons, with two packs of cards. The first pack is dealt, one card at a time, to the players; the second is placed face downward, in front of one chosen as leader of the game. The leader begins by asking a personal question beginning with "who," as "Who is the prettiest in the room?" or "Who will be married first?" at the same time turning over the top card of the second pack. The one of the players who has the same card in the first pack is supposed to be the one referred to in the question. He must hold up the card matching the one turned, as soon as he sees it, and then give it to the leader, who lays the two cards aside. The player who

had the matching card next asks a question, the leader turning up at the same time another card; and so the game goes on till the cards have all been used. The inquiries may be complimentary or otherwise.

TUG OF WAR. A sport in which any number of persons, divided into two parties or "teams," pull a rope in opposite directions. The tug may be pulled in two ways: in the first, there is no limit of time, but the teams pull until one has pulled the other over a given line; in the second, the pulling is for a certain number of minutes, and at the end of that time the team wins on whose side the middle of the rope is. In both methods the middle of the rope is marked, usually by tying a piece of colored cloth around it, and a person acting as judge or referee holds it exactly over the line as he gives the signal to begin pulling. In the first method, instead of requiring one team to be pulled over the line, two points in the rope are sometimes marked, at equal distances from the middle point, and the team that first pulls the opposite one of these across the line is the winner.

The second method is often used indoors, where the tug is pulled "from cleats;" that is, where each player has a wooden cleat or strip, nailed on the floor, to brace his feet against while he is pulling.

Four men make a team, and the one furthest from the cleat is called the "anchor," the one nearest the cleat being No. 1.

The rules of the National Amateur Athletic Association for tugs of war are as follows:

Tugs of war shall be pulled on cleats made of wood; same to be at least four inches thick, six inches high, and twenty-two inches long, and at least six feet six inches apart. The distance from the clamp in the centre to the first cleat on either side shall be not less than six feet.

The cleats shall be set on edge and bolted to the board.

The rope shall be a manila, three stranded rope, not less than four and a half nor more than five inches in circumference. There shall be a clamp equi-distant from the first cleat on either side, which shall be sufficient to hold the rope in position until released.

This clamp shall not make any appreciable kink in the rope. Any position may be assumed before the pistol is fired. No mechanical device shall be used for holding the rope. No belt other than one to protect the body shall be used. The flanges to hold the rope in place shall not be constructed so as to bind on the rope in any position that the anchor may assume. Leather shields and gloves may be used, and adhesive substances may be put on the same. The belt shall not weigh more than twenty pounds. Competitors shall not use weights in unlimited pulls, but in pulls limited to specified weights, competitors may use weights, providing the total weight of the team, including weights, does not exceed the limit.

The standard time limit for each pull shall be five minutes, and a rest of not less than ten minutes shall be allowed each competitor between trial pulls. A shorter or longer time limit may be agreed upon for other than championship contests.

When tugs of war are limited to teams of a given weight, competitors shall be weighed before competing. They shall be weighed as they pull; *i.e.*, including clothing, shoes, belt, etc.

The weighing-in shall be done immediately before the pull.

No knot of any kind shall be tied in the rope, and the rope shall not be passed more than once around the body of the anchor.

In no case shall any man pull on more than one team in a contest, and no substitute shall be allowed

to pull on any team that has pulled a trial.

In case a team gains three feet from its opponents, it shall be awarded the pull.

Immediately before the pull the captains of the opposing teams shall draw their numbers. If there are only two teams, two out of three pulls shall decide. With three teams—1 and 2 pull, the loser pulls 3, and the winners pull the final. With four teams—1 and 2, 3 and 4; the winners pull the final. With more than four teams, have a preliminary round of as many contests as the total number of contestants exceeds 4, 8, 16 or 32, and drop the losers. This leaves in 4, 8, 16 or 32 contestants, and the game then proceeds regularly with no byes or uneven contests. There shall be no byes. If there is a second prize it shall be competed for by all teams beaten by the winning team only.

In case of a tie both teams shall be credited with a win, and new numbers shall be drawn.

No pull shall be awarded by less than half an inch.

The individual tug of war shall also be governed by the team rules, and the contestants must pull from the first cleat from the clamp.

History. The tug of war had its origin in a boys' game sometimes called in England "French and English," and in this country "English and Americans," in which two parties pulled one against the other at the ends of a rope. Since it has been reduced to a systematic sport it has found a place in the programmes of most athletic meetings. (See ATHLETICS.)

TUNING FORKS, Experiments with. The tuning fork is a two-pronged instrument used by musicians to tune their instruments by, since it gives a pure, true note. Two of these forks will be needed, giving notes about a half a tone

apart. They may be bought at a music store.

A tuning fork may be sounded by rapping it on the edge of a table, by pressing the prongs together with the teeth and then suddenly releasing them, or by striking it with a stick.

EXPERIMENTS.

Sound a tuning fork, and while it is vibrating touch the end to a bare table. This sound will be greatly increased. This is because the table vibrates in sympathy with the fork, so that there is a larger sounding surface.

2. Sound the fork and hold it in succession close to the mouths of bottles and jars of various sizes, pouring in water while the fork is vibrating. When the volume of air in the jar is just large enough, it will vibrate in sympathy with the fork, giving out a loud sound.

3. Turn the fork around slowly while it is over the jar. The sound will rise and fall in loudness, being almost nothing when the corners of the prongs are toward the jar. Hold the fork up to the ear, turning it in like manner, and the same result will follow. This is because in this position the sound-waves from the inside of the prongs interfere with those from the outside.

4. Make a cardboard or paper roll, just large enough to go over one prong of the fork, and while it is in the position where it makes least noise, either in front of the ear or over the jar, slip the roll over one prong. The sound will at once increase, owing to the fact that the waves from one prong are cut off and cannot interfere with those from the other.

4. Make a wooden box about six inches long, four inches wide, and two inches thick, open at the ends. This is called a resonance box, and makes the fork sound louder, just as a table does; but it is more convenient, because it can be car-

ried about in the hand. Sound a fork, touch it to a resonance box, and walk slowly toward the wall with the fork. The note given will be now louder, now fainter. This is caused by the interference of the sound reflected from the wall with that proceeding directly from the fork.

5. Hold two forks tuned to the same note on resonance boxes several feet apart. They can be tuned together by sticking bits of wax on the prongs of the one which gives the highest note. The wax will load the prong, making it move more slowly and give a lower note. Sound one of the forks, and after a few seconds stop it. The other one will be found vibrating slightly. Its note can often be heard by placing the ear to the opening in the resonance box. If this does not succeed, the vibration can be detected by holding against one of the prongs a bit of glass as large as a pea, fastened to a thread by means of sealing-wax. This is a case of "sympathetic vibration," other examples of which are given under VIOLIN. The experiment will not succeed unless the forks be tuned to the same note.

6. Load one of the forks with wax so that it is almost, but not quite, in tune with the other. Sound them both at once, and "beats" will be heard, just as in Experiment 5, under VIOLIN.

7. Sound a fork and dip the prongs into a basin of still water. The vibration will cause curious ripples.

8. Gum a piece of tin-foil or a bristle to one prong of a fork; set the fork vibrating, and then draw it over a piece of smoked glass. The vibration of the fork will make the bristle draw a wavy line on the glass.

9. Touch one end of a long rod or pole to a resonance box, and touch a vibrating tuning fork to the other end. The rod will con-

duct the sound, which will come apparently from the box.

10. Sing the same note as that given by a tuning fork. Stop, and, holding the mouth in exactly the same position, hold the vibrating fork close in front of it. The mouth will act like the jar in Experiment 2, increasing the sound. If the mouth be fixed as if to sing any other note, the result will not be the same—the sound being increased very little, or not at all.

11. Bore a hole in a block of wood about an inch and a half square and fit in it the stem of the tuning fork. Place a tumbler of water on a resonance box, and after sounding the fork, dip the block in the water. The sound will be conducted through the water to the box, which will strengthen it just as if the fork had been placed directly on the box.

12. Place a piece of window glass three inches square over the mouth

Fig. 1.

of a glass tumbler, seeing that it touches the rim all around. Slide the glass slowly to one side, holding a vibrating tuning fork to the opening. When it reaches the right size, the air in the tumbler will give out a loud sound, in answer to the fork. (See A, in Fig. 1.)

13. Take a piece of thin paper, and, having wet it, paste it over the mouth of the tumbler. When it is dry, cut away part at one end so as to make a hole bounded by the edge of the tumbler and a straight line. Make this hole small at first, but cut away more and more of the paper till the air within answers the tuning fork as before. Sprinkle a little sand on the paper and sing the note given by the

fork. The sand will dance up and down. (See B, in Fig. 1.)

14. Tilt the tumbler by placing a book under one side (see B, in illustration), so that the sand almost runs down the paper by its own weight. If the proper note be now sung in any part of the room the sand will begin to move down the paper, but it will not move for any other note. If the gamut be sung, for instance, the sand will keep still till its own note is reached, when it will move at once.

15. Dip the mouth of a tumbler, five or six inches deep, into a soap solution (see SOAP BUBBLES), and then slide the glass plate through the soap water under the mouth. Take tumbler and glass out of the water and stand them on the table.

Slide off the glass while sounding the fork as in Experiment 12. There will be a soap film over the opening thus made, which, as soon as the air in the tumbler responds to the fork, will be covered with curious wrinkles. To see these to advantage, the light of the sky must be reflected from the film.

16. Tune two wide-mouthed bottles or glasses of equal size, by slipping pieces of glass over their

bottle interferes with that from the other. If a piece of paper be slipped between the fork and the mouth of either bottle the sound will at once be heard again (Fig. 2).

17. Suspend a light piece of cardboard by a string near a vibrating tuning fork; it will be attracted. Hold a candle flame near the fork it will be repelled. This is because the sound-waves in air attract bodies heavier than air, and repel those which are lighter.

18. Tie a silk thread six inches long to one prong of a tuning fork, and to the other end of the thread fasten a button or other object of slight weight. Vibrate the fork, holding it horizontally, and the thread will also vibrate, dividing up into segments, between which are points of no motion, or "nodes." (See VIOLIN, Experiment 2.) The number of segments seen when the fork is held with prongs side by side is double that when one prong is over the other. The number of segments is also greater when the weight on the thread is less.

TURKS AND RUSSIANS. A game played by two persons with slate and pencil. About a quarter of the slate is marked off by a line at each end, and in each of the compartments so marked off are made a number of dots about the size of a pin-head, those at one end representing Turks and the others Russians. The number of Turks and Russians may be large or small, as agreed on, but must be equal. At one end of each compartment is a small square which serves as a battery. Each player, in turn, places the point of his pencil in his own battery, and then draws a line quickly in the direction of his enemy's men. The line must have no angles in it, but may be straight or curved. Those dots through which the line passes are considered dead men, and he who first kills all of the enemy's men is the winner. Sometimes the players are required

Fig. 2.

months, as in Experiment 12, so that each will strengthen the vibration of the tuning fork. Stand one upright and lay the other on its side on a pile of books so that the mouths of the bottles just touch. The bottle on the books is kept from rolling off by bits of wax, and the glass over its mouth is held in place in the same way. Vibrate the fork and hold it horizontally between the mouths of the bottles. A position will be found where almost no sound at all is heard. This is because the sound from one

to shut their eyes or turn away their heads, when drawing their lines.

TWELFTH DAY. The sixth day of January; so called because it is the twelfth day after CHRISTMAS. It is also the feast of the Epiphany, on which is celebrated the visit of the three Magi, or Wise Men, to the infant Christ. In ancient times Twelfth Night was celebrated with great merriment and many games, and Twelfth Night parties are occasionally given now. As the wise men who visited Christ are said by tradition to have been three kings, one of the chief amusements of Twelfth Night is the choosing of a King and Queen by means of colored beans baked in cakes, whence it is sometimes called the "Bean King festival." One cake is cut into pieces and given to the boys and the other to the girls, and the boy and girl who find the beans in their pieces become King and Queen. Cards having written on them various titles, such as Prime Minister, First Lady in Waiting, etc., are now placed in two bags, the boys' titles in one bag and the girls' titles in the other. Enough blank cards are mixed with them to make the whole number equal that of the guests. Each guest now draws a card and assumes the title, if any, written on it. The hostess may provide appropriate costumes for the King, Queen, and Courtiers. The evening is usually spent in playing games. Among the amusements of Twelfth Night in ancient England were the blowing up or burning of pasteboard castles. A pastry stag, out of which flowed blood made of claret, was sometimes served on the table, and the guests pelted each other with eggshells filled with rose-water. Shakespeare's play of this name was so called because written for a Twelfth Night party.

TWENTY QUESTIONS. A game played by any number of persons,

divided into two opposing parties, one of which tries to find out, by twenty questions and one or more guesses, a subject chosen by the other.

Captains. In order to avoid confusion, questions are asked and answered only by the captains or leaders of the two parties; but before each question there is a consultation of all the players on the side that is to ask it, and the best answer is decided on by the other side in the same way.

Umpire. An umpire is generally chosen beforehand, to decide disputed points, and to avoid dispute he may take down in writing each question and answer as it is spoken.

Time Limit. In order to avoid taking too much time, it is usual to require a question or answer to be given within a certain time after the preceding answer or question. This time limit (usually three or four minutes) is agreed upon at the beginning of the game.

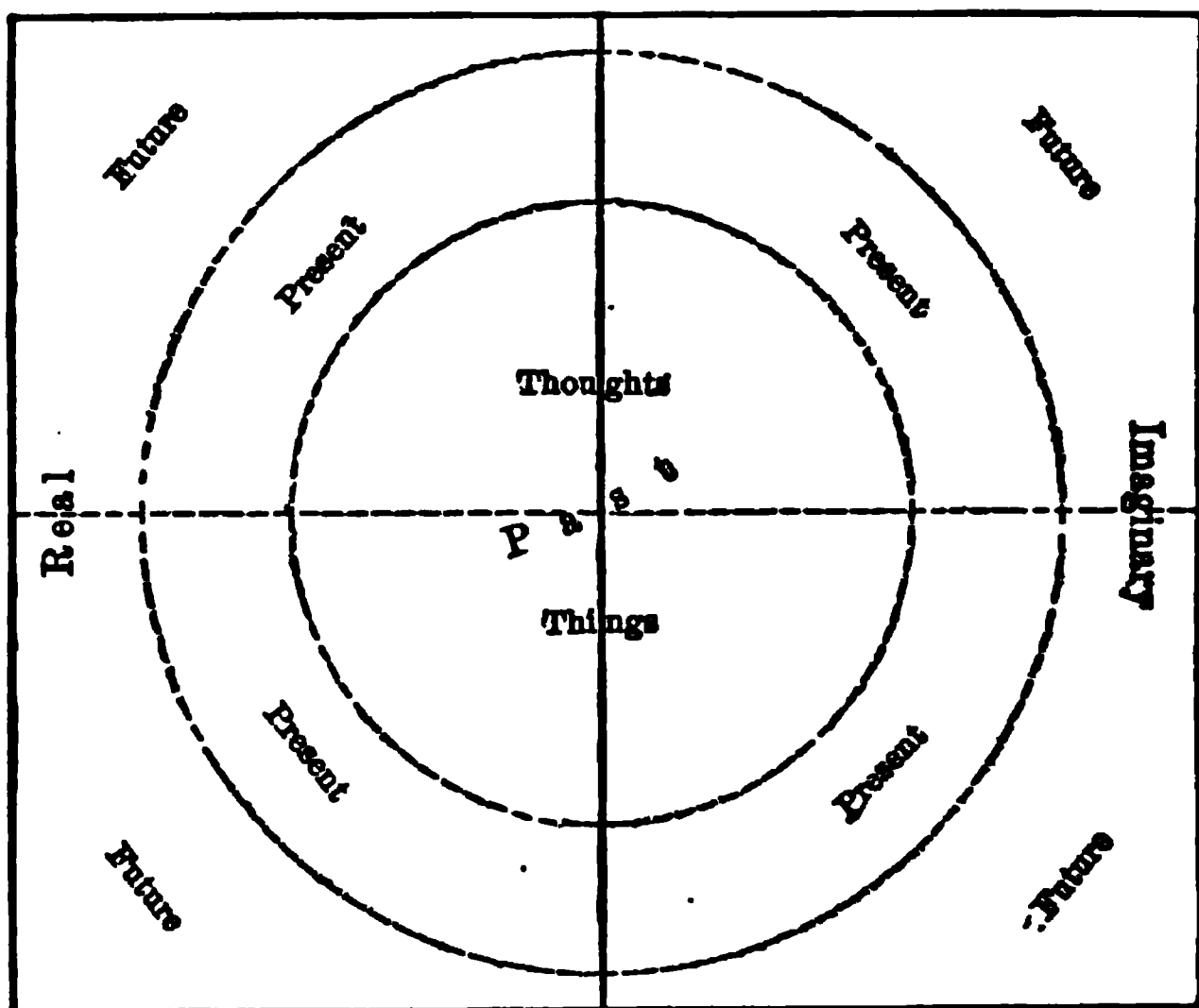
Guessing. When the questioning side have asked their twenty questions, or as many as they wish, they proceed, through their captain, to guess the subject. Sometimes only one guess is allowed, sometimes two or three, as agreed on before the game. If more than one is permitted, all but the last may be asked during the questioning. Thus, if there are to be three guesses, the questioners may ask ten questions, then make a guess; then six more, then make another guess, and so on. But if the last guess is wrong, wherever it may be made, the guessers lose the game. The subject must be guessed exactly as it is chosen. For instance, if it is "Mr. B.'s left eye," and the guess be "One of Mr. B.'s eyes," the answer must be "No." But if the question be asked, "Is it one of Mr. B.'s eyes?" the answer is "Yes." Then, if more than one guess is allowed, the right and left eyes can be guessed in succession. If not, "Is it his

right eye?" should be asked; and when the answer "No" is given, the guess "Mr. B.'s left eye" will of course be made. But if the party have asked their twentieth question, and have but one guess, they must take their chances of hitting it correctly.

GENERAL ADVICE.

Subject. In choosing a subject it should be remembered that those that appear difficult are often

easy to guess. If the questioners are skillful, and not likely to overlook anything, the difficulty depends simply on the number of separate things that must be found out in order to know the subject definitely. This kind of difficulty is possessed by a subject like "The second pane of glass from the upper left hand corner of the upper sash, in the third window from the eastern front corner of the second



Question Diagram.

story of the New York City Hall. Here, after finding out that the subject is "A pane of glass," at least seven more questions are required to locate it, since questions like "In what part of the City Hall is it?" are barred out, the answer being a part of the subject. By making the subject complex enough, it can thus be made impossible to guess it even in twenty questions; but subjects of this kind do not add to the interest of the game, and they should be restricted by rule.

Another kind of difficulty is pos-

sessed by subjects which are either far away or immaterial, like the "Garden of Eden," or "Courage." A beginner might be quite unable to guess either of these, but each consists of but one thing, and either may be guessed in a comparatively few questions. The best subjects are those that combine these two kinds of difficulty, as "The petal of a rose on the east side of the Garden of Eden," or "The Courage of Israel Putnam in entering the wolf's den." Subjects may also be adapted to the questioners. If they are not well acquainted with history, an

historical subject may be chosen, and so on.

Questions. In playing the game the questions should be asked according to some system, and the same system should be followed throughout. If one idea is followed out for two or three questions, and then abandoned and another taken up, twenty questions may easily be asked without getting much information. The more general questions should be asked at the beginning, the object being to divide the field of conjecture. This may be made evident by a diagram (shown on the previous page) supposed to contain all the things in the world. These are divided by the vertical black line into Real and Imaginary, and these again by the horizontal dotted line into Thoughts and Things. The space within the inner circle is supposed to be the Past, that between the two circles the Present, and that outside the Future. So if the question be asked, "Is it real or imaginary?" and the answer be "Real," everything in the right or imaginary side is left out of consideration. If the questioner next finds out that it exists now, he may confine himself to the space inside the inner circle, and so on. The diagram can be made much more elaborate, or divided according to a different plan. The one given will serve as an illustration, and the reader can amuse himself by trying to construct others.

One system of questioning that may be followed with a real object is to locate it exactly, which may often be done by a few skillful questions. The object, though real, may be one of a class, as "a shoe," in which case it cannot be located, but the nearest or most prominent one of the class may be inquired about. Or, instead of locating the object, its form, size and color may be found out exactly, or its use may be investigated;

but whatever line of questions is begun should be continued. In some cases, however, a skillful player will see, after one or two questions, that the kind of queries he is making will be of no use, and he then often prefers to change his tactics, even at a loss. For instance, if the first few questions as to form, color, and size show that the object is one whose appearance is totally unfamiliar, so that a full description would not help the questioner, that kind of questions should be abandoned. If the object is real but not now existing, it is a good plan to find out whether it is of historical interest.

If the first question shows that the subject is imaginary, it should at once be asked whether it is mentioned in a book; and if so, where. Most imaginary subjects can be reached thus. If the object is immaterial, it may be ascertained first whether it is an event, a thought, a quality, a sound, etc. Such subjects are generally hard to guess, but experience will suggest various lines of questioning that may be followed. As material objects are easiest to guess, a quality of character, or a thought is often best connected with some person. The question may be asked, "Name some person who possessed this quality of character in a high degree." "On what occasion did he show it?" etc. Often while the questioner is following out his plan, an answer will give him a hint of some "short-cut" to the desired end. In general, the questioner should not be afraid to ask questions in the beginning, but should never ask particular questions before general ones. Usually he can cut off a large part of the field of possibility left him, at each stroke, and this should be his general object. He should never alter his plan of attack except for some special reason. If a particular question be asked first,

it is often wasted. For instance, suppose the subject be "The sound of Patrick Henry's voice in the Virginia House of Burgesses," the question, "What is its shape?" would be useless, and would not have been asked had the questioner first found out that the subject was immaterial. Beginners often waste many questions in this and similar ways.

When the questioners are allowed more than one guess, one or two may be made in the midst of the game to test a theory; but when only one is allowed it should not be made until the guessers are sure they are right, unless all their questions have been asked. When the questioners think they know the subject, they had better test their knowledge by a particular question rather than by a guess; but this should never be done unless there is very good reason, for if the suspicion is unfounded, a question has been wasted.

Answers. The answering side should be careful to tell everything the question calls for, but no more. For instance, if the subject be "The blue Union of the American Flag," and the question is asked, "What is its color?" The answer "Blue" would not be correct. "Blue and white" would be the proper answer. "Blue with white spots" would tell also the arrangement of the colors, which is more than the question called for.

The following classified examples of subjects may be valuable to the beginner in showing him how they can be varied, and also in indicating the best order of questioning:

MATERIAL REAL SUBJECTS.

General.—A book; a man; a ring.

Particular.—The blue book on the table; Mr. S.; Mrs. B.'s ring.

Complex.—The third book from the left on the upper shelf of alcove 202 in the Blank library, etc.

Historical.—Martin Luther's Bible; Charles II.; the ring with which

Prince Albert wedded Queen Victoria.

MATERIAL IMAGINARY SUBJECTS.

Particular.—The book Mr. L. dreamed about the other night.

Mythological.—The Sibyl's book; the Cyclops; the ring of the Nibelungs.

Fictitious.—Arthur Pendennis; Aladdin's ring.

Historical.—The book Job wished his enemy to write.

IMMATERIAL REAL SUBJECTS.

General.—Courage; a sound; a thought; an event.

Particular.—Mr. B.'s courage; the ticking of the clock; Mr. B.'s thought about this subject; the party yesterday.

Complex.—The first note Madame X. sang to-day, in her first solo at the opera.

Historical.—Gen. Custer's courage at the Big Horn; the cheers that greeted Sheridan on his ride from Winchester; the thoughts of Napoleon after Waterloo; the signing of the Declaration of Independence.

IMMATERIAL IMAGINARY SUBJECTS.

Particular.—The courage I—thought he had.

Mythological.—The sound of Vulcan's hammer; the beauty of Venus; a council of the gods.

Fictitious.—"The sound of hammers, blow on blow," in Longfellow's "Building of the Ship;" the shipwreck, in Shakespeare's "Tempest."

It is often difficult to classify a subject; for instance, some might call a dream real but immaterial, and others might consider it imaginary.

The first of the two sample games which follow is from the short treatise on Twenty Questions by "Hotspur," and was played in Lenox, Mass., in 1880. It was understood at the beginning that the subject was Biblical. The second game is of historical interest, the

questioner being George Canning, English statesman. The two games show also the advance that has been made in questioning since Canning's time. It will be noticed that most of the questions in this second game are alternative; that is, contain the word "or;" and each question systematically cuts the field of possibility left open by the last.

Game I.

1. Is this subject mentioned in the Old, or in the New Testament? —The New.
2. In what book?—Acts.
3. With whom is it most intimately connected?—One of the Apostles.
4. What was his name? — St. Paul.
5. Material or immaterial? — Material.
6. What are its component parts?—Vegetable matter.
7. What is its shape?—An elongated oval.
8. What is its size? — About three-eighths of an inch in length, by about one-sixteenth of an inch in breadth and thickness.
9. What is its color?—Yellowish.
10. What is its use?—A means of preserving life.
11. In what way? — Various ways.
12. On the especial occasion you have in mind, in what way? — By being thrown away.
13. Whose life was it the means of preserving?—The lives of St. Paul and his companions.
14. Who threw it away? — St. Paul and his companions.
15. Where were they when they threw it away?—On the Mediterranean.
16. From what did it preserve their lives?—From death.
17. Death in what form?—Death by drowning.

Correctly guessed. "A grain of wheat of the cargo of the ship which carried St. Paul to Malta."

Game II.

1. Does it belong to the animal, or the vegetable kingdom?—To the vegetable.
2. Is it manufactured or unmanufactured?—Manufactured.
3. Is it a solid, or liquid?—A solid.
4. Is it a thing entire in itself, or in parts?—In parts.
5. Is it for private use, or public? —Public.
6. Does it exist in England, or out of it?—In England.
7. Is it single, or are there others of the same kind?—Single.
8. Is it historical, or only existent at present?—Both.
9. For ornament, or use?—Both.
10. Has it any connection with the person of the king?—No.
11. Is it carried, or does it support itself?—The former.
12. Does it pass by succession?—[Not answered, on account of uncertainty; but, by agreement, the question was counted one in the game.]
13. Was it used at the coronation?—Yes.
14. In the Hall, or Abbey?—Probably in both; certainly in the Abbey.
15. Does it belong specially to the coronation, or is it used at other times?—It is used at other times.
16. Is it exclusively of a vegetable nature, or is it not in some parts a compound of a vegetable and mineral?—Exclusively of a vegetable nature.
17. What is its shape? [Objected to as too particular, though it would now be considered perfectly proper. It was withdrawn, and not counted.]
17. Is it decorated, or simple? [Objected to, but the objection not sustained.]—Simple.
18. Is it used at the ordinary ceremonial of the House of Commons or House of Lords?—No.
19. Is it ever used by either House?—No.

20. Is it generally stationary, or movable?—Movable.

Guessed correctly by Mr. Canning. "The wand of the Lord High Steward." (The Lord High Steward of England was in ancient times the first officer of state in the English court, but now, as at the time of this game, there is no regular holder of the office. A temporary Lord High Steward is appointed to take part in coronations and the trials of peers. He has a wooden wand of office, which he breaks when his duties are over.)

Variations. Several variations are sometimes made in the game. One player may select a subject and allow the others to question him, either through a captain or in rotation.

When two parties play one against the other, the captains may be dispensed with, and the questions and answers given by the players in order.

The game may be played for points, in which case each side questions during a given number of games, and answers during the same number, the players on the sides remaining the same. The number of questions asked in each game is scored to the askers, whether the subject be guessed or not, and the side having the less number of points wins. In this way of scoring, to guess the subject in twenty questions counts no more than to fail altogether. This may be remedied by agreeing that a failure to guess shall count more than twenty against the askers. It may be agreed that the answerers shall be limited in their choice of a subject, the others undertaking to guess it in less than twenty questions. Thus the subject may be an event in American History, and ten questions may be allowed.

When the game is played by young children, more than twenty questions may be allowed, or the number may not be limited at all.

Learners may begin with a large number of questions, and gradually diminish it as they become more expert. Skilled players think that it is possible, if the questions are asked properly, to guess any subject in twenty questions, and that most subjects can be found out in from fifteen to eighteen.

The Three Kingdoms, or Animal, Vegetable, and Mineral. A kind of Twenty Questions in which the first question is "To which of the three kingdoms does it belong?" or "Is it Animal, Vegetable, or Mineral?" It was formerly considered that everything in nature belongs to the Animal kingdom, the Vegetable kingdom, or the Mineral kingdom; but there are many things hard to classify thus, and as subjects are now taken that are not material—such as thoughts, words, or ideas—it is rarely asked. In the old game of Animal, Vegetable, and Mineral the number of questions was often unlimited, while the answers were required to be merely "Yes" and "No," as in CLUMPS.

RULES OF THE GAME.

1. The umpire is elected by majority vote before the game. There is no appeal from his decisions.

2. The captains, if any, shall be chosen by vote of each side.

3. The parties shall determine by lot which shall question first, and afterwards they shall do so alternately.

4. The umpire shall take down in writing the subject and each question and answer.

5. The subject must have, or must have had, an actual existence either in fact, fiction, or imagination. It may be material or immaterial.

[This rule bars subjects like "The sound of a hammer that was not heard at the building of Solomon's temple," which we are told was once actually chosen.]

6. Any question may be asked

whose answer is not part of the subject. For instance, if the subject be "A button on Mr. Smith's coat," and the guessing party have found that it is a button on some one's coat, it is not allowable to ask "On whose coat is it?" The question "With what person is it most nearly connected?" is often objected to for a like reason. The legality of this question and others in doubt must be decided by the umpire.

7. It is not allowable to ask two or more questions at once; thus, "What is its shape and size?" must count as two questions.

8. If there are captains, they must in all cases give the questions and answers, and no attention need be paid to a question put by any other player.

9. If there are no captains, the questions are put and answered by the players in regular order, and no question asked out of that order need be heeded.

10. If it is impossible to answer a question exactly, as correct an answer as possible must be given, and at the same time its defects must be pointed out. Thus, if "Napoleon's little finger-nail" be the subject, and the question be "What was its size?" although of course the exact answer cannot be given, the answer should be "Probably about one-third of an inch in diameter; we do not know exactly." [The simple answer, "We do not know," though literally true, is not allowable in such a case, but sometimes no other can be given; in which case the umpire should permit it.]

11. A vague question may be answered vaguely. Thus, "Where is it situated?" "In the United States." The question in this case should be, "In what city or town is it?"

12. An answer made by a player not a captain, or out of regular order is not counted as an answer, but the questioners may use whatever information they gain from it. But

the answering side may endorse it if they please, and then it is treated as their regular answer.

13. When the players ask and answer in order, any one may decline to take his turn, and must then wait until the next round.

14. After each question or answer is written down by the umpire he shall call "Time," and the following answer or question must then be given within the time-limit previously agreed upon.

15. If any side fail to give its question or answer within the time-limit, the opposing side gain a question; that is, an extra question is allowed if they are the questioners, and one less if they are the answerers. A question is thus gained for every expiration of the time-limit; thus, if the time-limit be five minutes, and the answering party take sixteen minutes to consult over an answer, the askers are allowed twenty-three questions.

History. Twenty Questions is said by some persons to have been invented by George Canning, the English statesman, who was born in 1770, and it is sometimes called in England the Canning Game; but it probably existed in some form long before his time. Not only Canning but other eminent men, including William Pitt, were fond of the game. Pitt once guessed the subject "The stone on which Walworth, Lord Mayor of London, stood, when he struck Wat Tyler down, in Richard II.'s time." About 1880 the game became very popular in the eastern United States, but it had been played in this country many years before that time.

TWIRL THE PLATTER. A game played by any number of persons with a tin or earthenware plate. The players stand in a circle, and one of them, who may be chosen in any way, begins the game by twirling the plate on the floor in the middle of the circle, calling out at

the same time the name of one of the other players. That one must catch the platter before it falls to the ground, and then twirl it again, calling out the name of some one, as before. Any player failing to catch the platter before it falls must pay a forfeit. Sometimes the players are numbered, and the one who twirls the plate calls out a number instead of a name.

TWIRLER. An arrangement for spinning objects rapidly, used in some of the scientific experiments described in this book. It consists usually of two wheels fixed on a stand, and so connected by a band that by turning a handle fixed to one, the other revolves very rapidly. The object to be twirled is fixed to this second wheel. Twirlers can be bought of dealers in scientific or school supplies, or its place can be supplied by the wheel of a toy cart. Turn the cart bottom upward, pin or tack the object to be twirled to one side of the wheel, and twirl it from the other side with the forefinger. If the object is to be twirled horizontally—as, for instance, a pail of water—the cart may be placed on its side on a table with the wheel to be used projecting over the edge. The cart is kept in place by putting a weight on it. The string supporting the object is now tacked as near the middle of the hub as possible, and the wheel twirled as before.

An excellent twirler can also be made as follows: Support a board

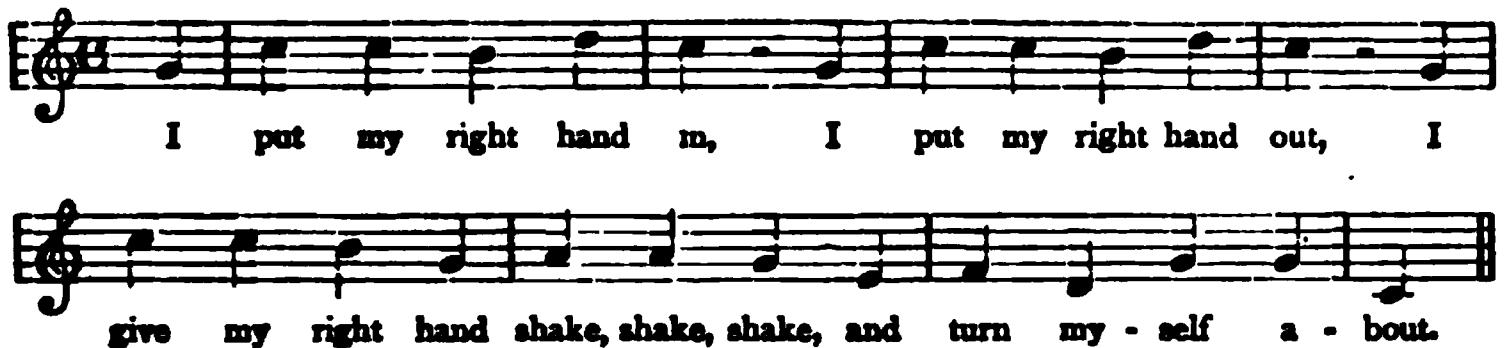
from six to twelve inches wide and a few feet long, by placing one end under the top of a door-way, opening the door slightly, so that the middle of the board rests on it. Over the free end of the board

Twirler.

hang a circle of twine so long that the lower end reaches within two feet of the floor. This end should be provided with a hook. If the twine now be twisted and the object to be twirled hung on the hook, the untwisting of the cord will make the object spin. It will move still more swiftly if it is assisted to untwist by pressing downward with a stick just above the twisted part. A flat piece of cork may be strung on the twine a little above the end, and kept in place by knots. On this colored disks of paper may be placed, producing the same effects when spun as the color Top.

U

UGLY MUG. A singing game, played by any number of persons. A leader is chosen, who stands facing the rest of the company. They must imitate every gesture that he makes, and those who can do so sing with him. He sings, to the tune given below:



As he sings he suits the action to the words, first stretching out his right hand, then facing in the opposite direction and extending it again, then shaking it, and finally turning back to his first position. In like manner he then sings:

"I put my left hand in," etc.
 "I put my both hands in," etc.
 "I put my right foot in," etc.
 "I put my left foot in," etc.
 "I put my both feet in," etc.
 "I put my ugly mug in," etc.

To "put both feet in" the players jump forward, and to shake them they dance up and down. At the last line the players stretch their heads forward. Sometimes those who laugh are required to pay forfeits.

In England this game is called "Hinkumbooby" or "Looby Loo-by," and the verse begins:

"Looby, Looby, Looby,
 All on a Saturday night."

UNCLE JOHN. A singing game played by any number of boys and girls. The players dance hand in hand in a circle singing:

Uncle John is very sick;
 What shall we send him?
 A piece of pie, a piece of cake,
 A piece of apple dumpling.

What shall we send it in?
 In a piece of paper.
 Paper is not fine enough;
 In a golden saucer.
 Whom shall we send it by?
 By the king's daughter.
 Take her by the lily-white hand,
 And lead her o'er the water.

The dancers then sit down, and the last down (supposing it to be a girl) selects a friend and whispers in her ear the initials of some boy. She then takes her place in the ring, but facing outward, while the friend announces the initials, and the players again circle and sing:

"X. Y., so they say,
 Goes a-courting night and day,
 Sword and pistol by his side,
 And — — to be his bride.

He takes her by the lily-white hand
 And leads her o'er the water;
 Here's a kiss, and there's a kiss
 For Mr. —'s daughter."

The one whose initials were given then kisses the girl who gave them; she faces inward, and the game goes on as before. If the player last down was a boy, his full name is given in the first line of the last-quoted stanza, and the initials he gives are inserted in the fourth line.

V

VALENTINE PARTY. An entertainment at which each guest gives a valentine to every other. The party must be given on or near St. Valentine's day, February 14th. The hostess informs each guest beforehand what he or she is expected to do, and at least a day beforehand each guest must send in his valentine. On the evening of the party some one appointed by the hostess reads them all aloud, giving each to the person to whom it is addressed, after it is read. Assumed names are usually signed to the valentines, which may be sentimental or ridiculous, as the writer pleases. Sometimes each guest is allowed to write as many or as few valentines as he wishes; and if the hostess finds, on looking them over, that any guest has received none, she either writes him one herself or asks some one else to do so.

VEGETABLE MUSICAL INSTRUMENTS. Rude musical instruments of several kinds can be made from trees or vegetables. Some of these are described below.

Willow Whistles. A green willow stick from two to five inches long is cut, as in Fig. 1. The bark is loosened by pounding it carefully with a smooth stone or the handle of a pocket-knife till it will slip off. A thin slice of wood is then cut from the notch A to the end of the stick at B, and then the bark is slipped on again. (See Fig. 2.) If the whistle has been properly made, blowing at the end B will make a shrill noise.

Willow whistles were once supposed to have the power of causing rain. Swiss children, when they make these whistles, sing "Franz, Franz, lend me your pipe," which is supposed once to have been an appeal to a water spirit.

Squash Trumpets. From the leaf-

stalk of a squash or pumpkin vine the leaf is cut through the fleshy part so that the hollow stalk will be closed at that end. A slit about an inch long is then made lengthwise, close to the closed end. When that end is placed in the mouth so that the slit is entirely within, a harsh note may be produced by blowing. If little holes are cut in the stem different notes

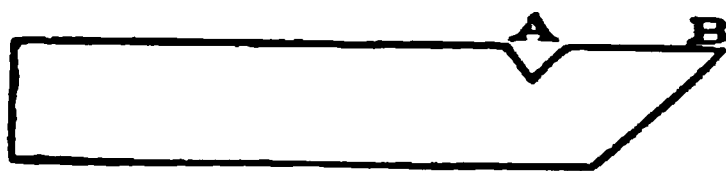


Fig. 1.



Fig. 2.

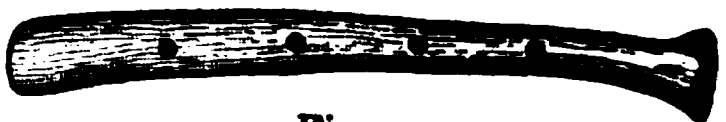


Fig. 3.



Fig. 4.

Vegetable Musical Instruments.

may be produced by stopping these with the fingers; and by cutting them at the right distance apart—which may be done after a few experiments—a tune can be played. (See Fig. 3.)

Corn-stalk Fiddle. A piece of corn-stalk is cut so that a joint will be at each end. Part of the edges of the concave side are then slit so as to detach two cords, the joints holding them at the ends. Then two bits of stick are cut, of the thickness of a slate pencil and about an inch long, and one is pushed under the cords at each end, to raise and tighten them. This makes the fiddle. (Fig. 4.) The bow is made in like manner

of a smaller piece of stalk, and when one is drawn across the other a squeaking noise results.

VERBARIUM. See **DICTIONARY.**

VIBRATING RODS, Experiment with. Obtain two pieces of white pine, each four feet long, one inch wide, and quarter of an inch thick. On the flat side, close to the end of each, fasten with wax a bit of

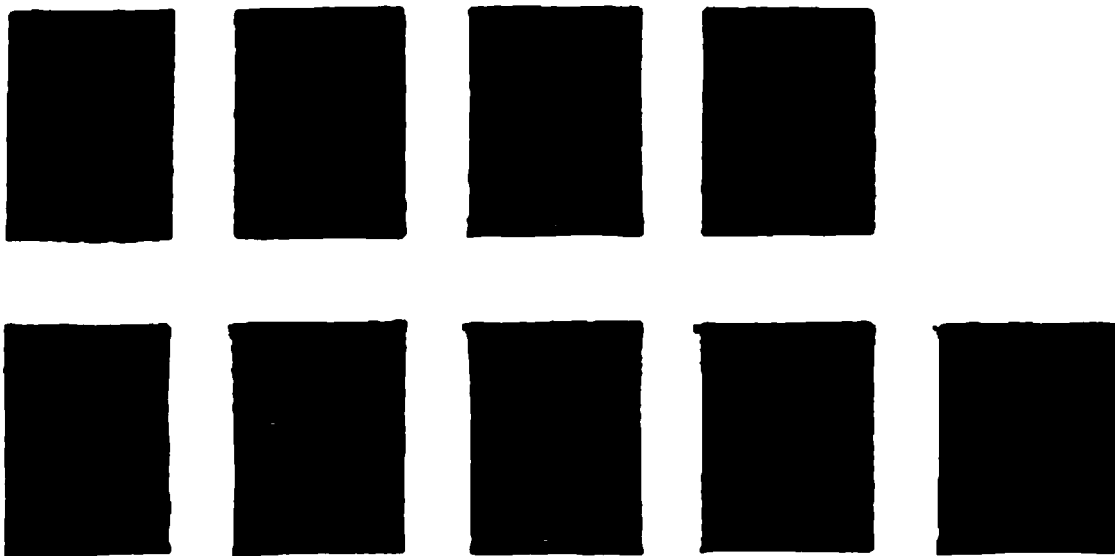
silvered glass one inch square. Fill two dry-goods boxes (A and B, Fig. 1) about fourteen inches square, with sand, to serve as steady supports for the rods. Fasten one rod, C, upright to one of the boxes by two screws so that the rod projects above the box just thirty inches. The other rod, D, is held horizontally across the

Vibrating Rods—Fig. 1.

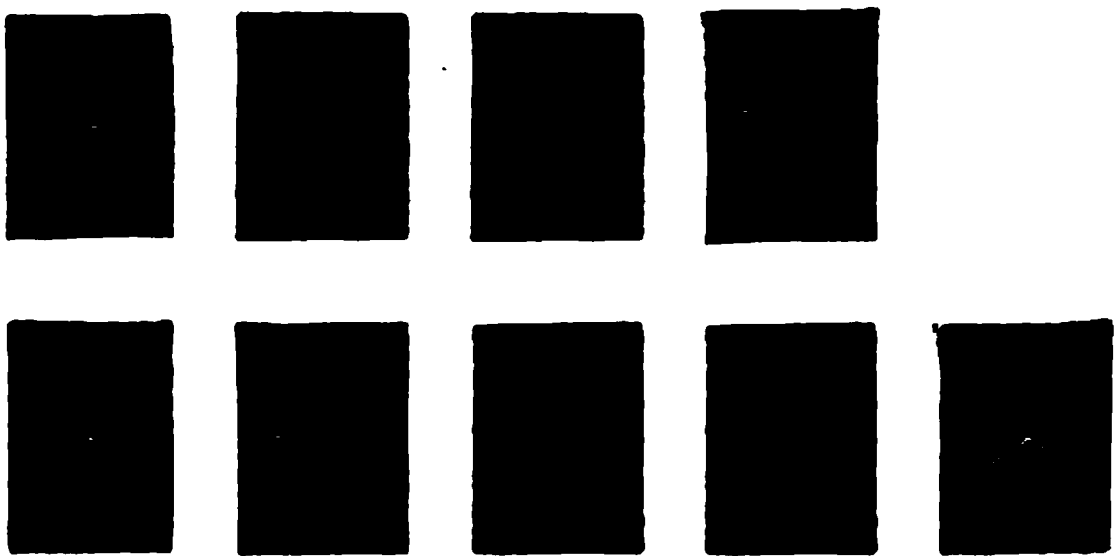
side of the other box by two bits of wood, F, G, screwed across it but not into it, so that the rod may be slipped forward and backward. Over the mirror of the upright rod is pasted a piece of paper one inch square with a hole in its centre a quarter of an inch in diameter. A beam of light from a heliostat or a lamp is allowed to enter the room. In case a lamp is used, it must be covered all but the opening through which the light passes, and a **LENS** must be set in the

beam so as to make the rays parallel. The box supporting the upright rod is so placed that the beam falls squarely on the mirror at the end of the rod. The other box is placed on a table, and the horizontal rod is slid out till just thirty inches of it are beyond the box. The box is now disposed so that the beam is reflected from the upright rod to the mirror on the horizontal rod, and thence to the wall, or a screen at S, where it appears as a bright spot. If the up-

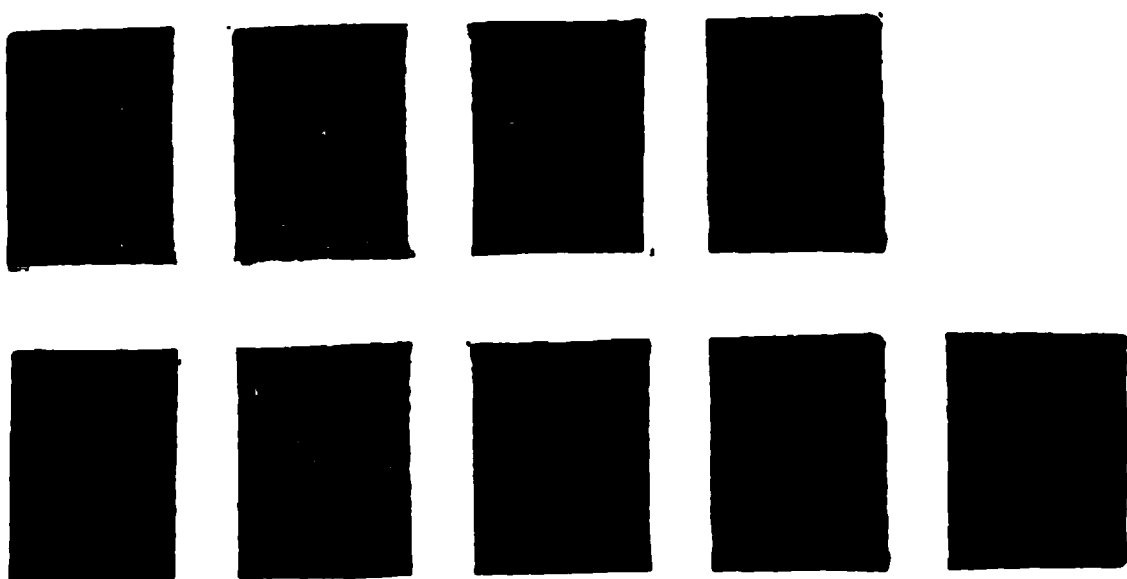
right rod be made to shake to and fro by giving it a pull and letting it go, the spot becomes a vertical line, which grows shorter and shorter till the rod stops. In like manner, if the horizontal rod is



Vibrating Rods—Fig. 2.



Vibrating Rods—Fig. 3.



Vibrating Rods—Fig. 4.

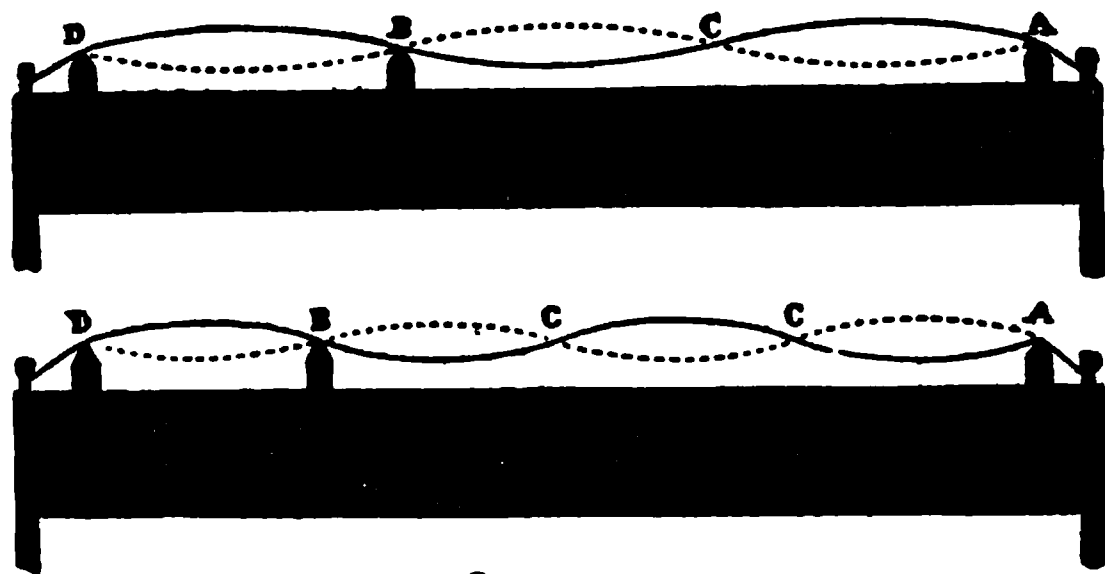
made to shake, there will be a figure like those obtained with the bright horizontal line on the screen. If both rods together be made to shake, the result will be a **DOUBLE PENDULUM**, but much more clear and beautiful. The kind of figure depends on the

length of the horizontal rod. With the length given above—that is, where the vibrating rods are equal—it will be like that in Fig. 2. Unless the rods have been very exactly adjusted, the figure will change, becoming in turn each of those represented in the illustration. Other curves are shown in Figs. 3 and 4, and many others still will be obtained by sliding the rod D in and out.

VIOLIN, Experiments with a. These can be tried equally well on a banjo, or guitar, but a violin bow is necessary for some of them.

1. Loosen all the strings but one—preferably one of the middle strings. Pluck or bow it first exactly in the middle and then close to one end, listening carefully. There is a difference in the sound, which has more “twang” when the string is plucked at the ends. This is because the note given by the string is composed of several faint ones, called “overtones,” beside the loud one which is most plainly heard, and more overtones are present when the string is plucked at the end.

2. Press the finger firmly down



Sonometer.

exactly on the middle of the string, and sound it again. The note heard will be an octave higher than the original note. Touch the finger lightly to the same spot, and sound the note as before. The result will be the same, but by looking closely it will be seen that both halves of the string are vibrating. By pressing the string at a third its length from the bottom and drawing a bow across the smaller part, the fifth above the note given by the whole string is obtained. By touching the same spot lightly and bowing as before, the whole string can be made to vibrate, the longer part vibrating in halves. The whole string thus vibrates in three parts. The points between the vibrating parts, which are almost still, are called “nodes.” If it cannot be seen that the string is vibrating in

parts, bend a little narrow strip of paper and hang it over the string where the node ought to be. When the string is made to vibrate the paper will be agitated only a little, whereas if it be moved along a little way it will shake violently, or be thrown off the string. By touching different points of the string a skilled violin player can make it vibrate in four, five or more sections. Notes thus produced are called “harmonics.”

This experiment will succeed better if a Sonometer is used, which is easily made as follows: Take a piece of violin string, or piano wire, a little longer than the table you wish to use. Tie it to a nail at one end of the table and pass it over a pulley screwed horizontally into the other end. To the end of the string tie a tin pail filled with sand,

nails or scraps of iron. It may, instead, be fastened to a second nail, as in the diagram, but the other way is best, as the pull on the string can then be easily altered. The string should now be flat on the table, or nearly so. Cut wedge-shaped sticks of wood and place them under the string, as shown in the picture at A, B and D. By letting the wedges at the ends remain and moving the third, the same results will follow as if the string were touched with the finger. Two ways of vibrating are shown in the diagram, the nodes being at C. The weight of the pail can be varied by taking out or putting in nails or sand, thus stretching the string to the desired degree.

3. Sound a string and then touch it lightly in the middle. It will give the octave faintly.

4. Loosen all the strings of a violin but two, and tune those to the same note, pluck one, and then stop it; the other will continue to sound. Tune one slightly higher or lower than the other, and try the same experiment. The second string will still sound, but not as loud or as long as before. This is called "sympathetic vibration." The notes which are most sympathetic, or are set in motion most easily by a vibrating string, are the same note, its octave, the fifth above the octave, the second octave, and the third and fifth above that. This is shown best by experiments on the PIANO.

5. Tune the two lower strings as nearly as possible to the same note, and loosen the others. Place the ear behind the drum, if the instrument be a banjo, or close to the openings in the body, if it be a violin or guitar. Pluck the two strings together, and the resulting sound will be heard, first louder and then softer, in waves or pulsations. These are called beats. If they are not heard, raise or low-

er the pitch of one of the strings a little. The beats will be slower the nearer in tune the two strings are, and faster the farther they are apart; but if the notes are not very near, the beats will be so fast that they cannot be distinguished. They can be heard still better with TUNING FORKS.

VITESSE. A game played by two persons, each with a full pack of CARDS. Each player sits with his pack face downward before him, and at a signal both begin to turn over their cards one by one, face outward, and throw them on the table. They do not take turns, but each plays as fast as he can, repeating as he does so the names of the thirteen cards from Ace to King, over and over again, one for each card he turns. Whenever the card turned is the same as the one called out, he must lay it by itself, and begin again at the Ace in calling out. The player who first lays aside thirteen cards in this way wins. But if a card is once passed that should have been thrown out, the player must go on as if it had been any other card. The game of Vitesse thus requires quickness of hand and eye, and at the same time close attention, and a practised player will always win over a beginner, though it looks so simple.

The word Vitesse is French, and means Quickness.

VOLTAIC PILE. A kind of ELECTRIC BATTERY, named after its inventor, Alexander Volta. A simple one may be made as follows: Take a glass tube about an inch in diameter—an argand lamp chimney from which the lower part has been removed may be used. Paste two sheets of ordinary gold paper back to back and cut out disks just large enough to slip into the tube. The disks can be cut several at a time by first folding the paper. Cut an equal number of disks in like manner from silver paper, and then

make a pile of them, gold alternating with silver. The tube must thus be filled with the disks pressed together as tightly as possible, and closed at each end with a cork, through which passes a wire touching the end disk. A LEYDEN JAR may be charged with such a pile by connecting one wire with the knob and the other with the outer

coating. The electricity in the pile will last a long time,

VOWELS, THE. A game played by any number of persons who sit in a row. Each, in turn, asks a question of his right-hand neighbor, at the same time requiring him to answer without using some one vowel. If the vowel is used in the answer, the offender pays a forfeit.

W

WALKING TRIPS. In making a walking trip as few things as possible should be carried, as every pound of weight adds to the fatigue. In this article only necessities are considered.

Outfit. The shoes should fit the feet easily, and the soles should be neither so heavy that their weight is uncomfortable, nor so light that the feet feel through them the roughness of the ground. Low shoes should not be worn, as they admit dust and dirt. For climbing rocky hills or mountains heels filled with iron nails are best, as they hold to the rocks. Steel should not be used, as it is hard and slippery. The inside of the sole should be perfectly smooth. A roughness or lump which would not be noticed in an ordinary walk may become painful after a tramp of twenty or thirty miles. The best plan is to wear movable leather in-soles. As soon as the least lump is perceived the shoe should be taken off, the sole removed, and part of its under surface pared off with a sharp knife, just under the uncomfortable spot. If this is done faithfully, the soles will be perfectly fitted to the feet at the end of a day's walk, and the trouble of doing it will be amply repaid by the increased comfort. This simple method of adapting the sole to the foot

was devised by Russell A. Bigelow, a New York lawyer. Some people put sweet oil or salve on the feet when they begin to chafe, and they should be washed frequently.

The other articles of dress may be according to the fancy of the wearer, so long as they are easy-fitting and comfortable. For warm weather, gauze underclothing and a loose flannel shirt are best, with a light jacket to wear when not walking. For colder weather the shirt may be tighter at the wrists and neck and the underclothing thicker. In all seasons knee-breeches and a soft hat are best. One can buy a knapsack, which may be strapped on the back, or, if his bundle is small, it may be carried in the hand. It is generally better to carry a small weight in the hand than in a knapsack. Other articles that may be carried are slippers, to rest the feet at night (some think that these should be taken, even if nothing else is); a change of underclothing; needle and thread; buttons; adhesive plaster; fish-line and hooks; extra handkerchiefs; pen, ink and paper; a ball of twine and matches. If the trip is to last more than a few days, so that a change of underclothing is positively necessary, it may be packed in a valise and sent by express to some town on the road. One valise

can usually be made to answer for a party of four or five.

A cane or staff is a great aid in climbing, or in the latter part of the day, when the walker is tired; but as it is often in the way, it is best to cut a fresh one when it is wanted.

Shelter and Food. In some parts of the country it is possible so to arrange the trip that every night shall be spent at a hotel. Otherwise it is necessary to ask for shelter at farmhouses, or in a very wild country to CAMP OUT; but this requires extra luggage. In some parts of the United States it is very easy to get shelter for the night at a farmhouse; elsewhere it is often impossible. If the walking party wish to stay at farm-houses, they should inquire beforehand of some one who knows the country whether they can do so without trouble. The mid-day meal should be light, unless a rest of several hours is taken after it. No food should be taken when tired, and it is best to rest at least half an hour before eating. The pedestrian is apt to be very thirsty, especially on a warm day. Many authorities say that no water at all should be taken while walking, and that the blood should be cooled by simply bathing the wrists and temples freely at intervals, or plunging the arms into water up to the elbows. Others drink freely of spring water. Perhaps it is best for each to decide for himself which way is best.

Distance and Hours. Unless the walker has been used to walking eight or ten miles a day, he should go not more than fifteen miles on the first day, and increase this distance by two or three miles a day till he feels he has reached the limit of comfort, say twenty-five or thirty miles. The tendency of beginners is to walk as far as they can the first day, with the result that they are too lame on the next day to go more than five or six miles without pain. Ten hours a

day at a rate of three miles an hour is quite enough. In a long trip, lasting many weeks, the muscles become hardened, and much more than this can be done — thirty-five miles a day, or perhaps even forty; but this is an extreme. For most boys under eighteen years, twenty miles will be found quite enough; and this distance must be lessened, if weight is to be carried. The best time to walk is in the morning and late in the afternoon, taking a long rest at noon, before and after the mid-day meal. It is best both to retire and to rise early. If the legs and feet feel hot and full of blood while walking, it is a great relief to lie on the back and hold them up as straight as possible against a tree or wall for a few minutes. If the whole body is tired, one of the best resting postures is to lie flat on the face on the ground. This is said to be a favorite position with the Indians when tired. But there is no reason why more than a pleasant degree of fatigue should ever be felt, if the walker does not overdo.

The walker generally suffers from sunburn during the first two or three days, but it usually ceases after a time. The second day of the march is generally most fatiguing. The change of life and excitement often keep him from sleeping soundly through his first night, and he often feels tired when he wakes. The fresh air makes him very thirsty, and his stomach often becomes disordered. These symptoms, however, will soon pass away. No medicines nor alcohol should be taken, though laxative food, such as fruits, is good.

Routes. The general road to be followed should be studied on the map before starting, leaving the exact route to be decided on from day to day. For parts of the country that are the resorts of tourists there are guide-books, giving the best routes, the names of hotels on the

road, and much other information. If part of the route lies over a country where there is no road, the direction of the nearest town must be found out from a map or otherwise. A pathless walk of more than an hour requires a compass. While walking in a forest it is necessary to get the right direction only at first; it can be kept by "lining" trees. This is done by selecting three trees on a line with the eye in the proper direction; after the nearest is passed another is taken, beyond the last, so that three are always kept in view. It is never safe to trust to instinct to keep in a straight line in the woods, for most people naturally walk in a circle, owing to the fact that one leg is slightly stronger than the other. Persons lost in the woods have often travelled thus in a circle, sometimes for days.

Party. A large party is more enjoyable in some respects, but it has the disadvantage that some will always want to walk farther than others, and that it is difficult to agree on the route, the hours, and the resting places. The best plan is either to choose a leader with power to decide these things, or for all to agree to follow the wishes of a majority. When one person walks alone, he can do exactly as he pleases, but such a trip is apt to be lonely, and it is also dangerous, for in case of accident there is no one to give or obtain aid.

WANDERING CARD. A SOLITAIRE game of CARDS, played with one full pack. The first 13 cards that are taken from the pack are laid in a row, as they come, face upward. The next 13 are laid on these in the same order. As each of the second 13 is played, the number of the pile on which it is placed is spoken, and if the number of pips on the card is the same, the card is laid aside, and the next card is laid on the next pile. Knives count as 11, Queens 12, and

Kings 13. This is repeated till the pack is out, when there will be four cards in each pile, except where a card has been put aside. The top card of those laid aside is now taken and slipped under the pile having the corresponding number. The top card of that pile is slipped under its proper pile, and so on till one is reached that is in its proper place. Then the next card of those laid aside is taken, and so on till all have been used. The player has won if the pack is arranged at the end of the game in 13 piles each of which contains four cards of the same value.

Clock, The. A variation of the preceding game. Cards are placed in twelve piles of four each, face downward in a circle, and numbered to correspond with the figures on a clock dial. The thirteenth pile is placed in the centre. The top card of the middle pile is now turned and placed face upward under its proper pile, and so on, as in the game just described.

WATCH, Experiments with a.

1. Close the ears tightly, and hold the watch firmly between the teeth. The ticking will be heard distinctly, because the sound is conducted through the teeth and the bones of the head to the inside of the ear.

2. Let one person hold the watch against the end of a long pole, and let another press the other end of the pole against his ear, or hold it between his teeth. He will hear the watch tick distinctly, the sound being conducted along the pole.

3. Let one person hold the watch and another walk slowly away till he just ceases to hear the ticking. Let the first person now hold the watch in front of a concave mirror, such as is used for lamp reflectors. The second person will find that he can hear the watch tick if his ear is directly in front of the mirror, but that the sound ceases if he moves to one side or the other. (See REFLECTION OF SOUND.)

WATCH, Trick with.

1. To indicate on the dial of a watch the hour secretly thought of by another. Taking a pencil, the performer taps with it the hours on the dial, asking the other to count the taps mentally, beginning from the number he thought of. Thus, if the number were six, he must count the first tap as seven, the next as eight, and so on. He is instructed to say "Stop" as soon as he reaches the number twenty, when the performer's pencil is found to point to the number thought of. The trick is performed as follows: The first seven taps may be given on any numbers whatever, but the eighth must invariably be given on the number XII, the ninth on XI, and so on backward around the dial. When the spectator, having reached 20, says "Stop," the tap will be made on the number he thought of. The reason is easily understood by those who understand algebra. Let x be the number thought of. Then the first tap is numbered $x+1$ and the eighth $x+8$. But if $x=12$, $x+8=20$, and the spectator will "Stop," therefore the tap must be made on the figure XII. If $x=11$, $x+8=19$ and $x+9=20$, therefore the ninth or next tap must be made on the figure XI, and so on.

WATCHMAN, THE. See GOING TO JERUSALEM.

WATCHWORD GAME, THE. See DICTIONARY.

WATER CLOCK. A device for telling time by means of water. A simple one can be made as follows: Stop up one end of an argand lamp chimney with a cork, through which passes a glass jet (see CHEMICAL EXPERIMENTS) drawn out so fine that water will pass through it only in drops. Fill the chimney with water, marking the level by a scratch made with a diamond or sharp file. As the level slowly falls, mark it anew every fifteen minutes or oftener, as desired, making lar-

ger marks every hour. The chimney can now be used as a clock by filling it and letting the water begin to drop exactly at some hour. If it be desired to distinguish smaller intervals of time, the water must be allowed to drop out faster, so that the level will fall more quickly; but then the clock requires filling oftener, unless a long tube be used. The marks on the tube will be closer together at the bottom than on top, for, as the level falls, the pressure decreases and the water drops out more and more slowly. To be exact, the clock must be kept at the same temperature, as otherwise the water will flow out at different rates of speed.

The water clock was used by the Greeks, who called it *Clepsydra* (from *kleptein*, to steal away, and *hudor*, water).

WATER CUTTER. See CIRCULAR SAW.

WATER DROP, Experiment with a large. Across a barrel-hoop, from fourteen to twenty-four inches in diameter, stretch thin sheet india-rubber. Pour water on it, and it will sag downward, making a sort of bowl. Continue to pour water in gradually, and finally the rubber bowl will all at once change its shape. Dip out a little water, and it will take its old shape again. The sheet of rubber filled with water is like a huge water drop, only it cannot wholly detach itself and fall to the ground like a real drop. The change of shape can also be produced by dipping the hand into the water. An amusing way of showing the experiment is to drop a coin into the water and then ask some one to pick it out. As soon as the hand is thrust under water the rubber bowl will drop downward, carrying the coin farther away from the hand. To perform this experiment properly it is necessary that the rubber should be neither too tight nor too loose at the beginning. The proper tightness va-

ries with the size of hoop, and is best found by trial.

WATER MILL, or WATER ENGINE. To make a water mill, take two glass tubes (see **CHEMICAL EXPERIMENTS**) about a foot long, and bend two inches of each at each end at right angles, but in different planes, so that if the bent part at one end be held vertical that at the other will be horizontal. Looking along the tube from one bend, held vertical, the other bend must be in the same direction in both tubes; that is, both must be to the right, or both to the left. Make a jet at one end of each tube. In one end of a glass cylinder (an argand lamp chimney will do), fit a cork or rubber stopper with two holes. In these holes fit those ends of the tubes at which the jets were not made. The tubes extend in opposite directions, and the jets therefore point to opposite sides. Suspend the lamp chimney by tying a string around it at one end, and then fill it with water. As the water runs out through the jets the reaction will make the mill spin around.

WATER PRESSURE, Experiments on. 1. Bend a piece of glass tubing into the shape of a letter U, but with one branch much shorter than the other. The longer branch may be six inches long and the shorter one inch. Pour mercury into the tube till it stands about half an inch high in each branch. Thrust the tube under water so that the opening of the long branch remains above the surface, and the mercury will rise in the long branch. The deeper the tube is in the water the higher the mercury rises. For a depth of six inches it rises about half an inch. The mercury is pushed up by the pressure of the water on the smaller branch of the tube, and the pressure increases with the depth of water.

2. Plunge the tube to any depth in a pail of water; say five inches; note the height of the mercury, and

then plunge it to the same depth in a bath-tub full of water. The mercury will rise to the same height in both cases. The reason is that water pressure depends on the depth, not on the amount of water in the vessel.

3. Attach a thread to the centre of a circular disk of cardboard about an inch and a half in diameter, by passing through it a sewing needle and knotted thread. Pass the thread through an argand lamp chimney so that the disk can be held firmly against one end by the thread. While it is so held, push that end of the chimney down into a pail of water. The upward pressure of the water will hold the disk to the end of the chimney without the aid of the string. Pour water into the chimney, and when that on the inside has reached the level of that on the outside, the disk will fall. The reason is that the upward pressure of the water on the disk is just equal to that of the water that was poured in, so that the pressure on both sides balanced, and there was nothing to hold the disk up.

4. To the end of a glass tube about half an inch in diameter tie tightly an india-rubber bag or balloon, and fill the balloon with water, which may be colored, to make it more easily visible. Thrust the balloon into water, and the colored water will rise in the tube farther and farther as the balloon sinks deeper.

WATER WHISTLE. A whistle may be played under water by attending to the following directions: Buy a tin whistle or flageolet at a toy shop; close the hole nearest the mouth-piece by putting wax over it, and connect the mouth-piece with a water faucet. Stand the whistle upright in a jar tall enough to hold it and turn on the water, which will run through the whistle. Fill the jar, and overflow it. If the flow be now carefully regulated, a k

but distinct musical note will be heard, caused by the water flowing through the whistle.

WAX WORKS. See MRS. JARLEY'S WAX WORKS.

WEAVING. The process of weaving is explained in C. C. T., in the article Loom. It is possible

Weaving—Fig. 1.

to weave on a small scale with no other tools than two lead-pencils, a piece of cardboard and some yarn or string. Cut the cardboard (which may be an ordinary visiting card), as shown in Fig. 1, making slits

Weaving—Fig. 2.

about an inch long, and punching holes half-way between them along the horizontal line. Lay the pencils on a table so that about two-thirds of each will project over the edge, supporting them by a book laid on the ends (see Fig. 2). The pencils should be about six

inches apart. Now tie one end of a piece of yarn several yards long to one of the pencils near the table pass the other end through the first hole in the card, around the other pencil, back through the adjoining slit, around the first pencil, through the next hole, and so on—always passing it through a hole in one direction and back through a slit. After all the holes and slits have been passed through thus, tie the yarn. The yarn thus arranged forms the warp of the cloth, and the card takes the place of the healds, for by pushing it up and down it will be seen that one set of threads is brought first above and then below the other. Cut a shuttle out of cardboard in either the shapes shown in Fig. 1, and wind yarn upon it for the weft. Pull the card up, pass the shuttle between the warp threads in one direction; then push the card down and pass the shuttle back, and continue until the piece of cloth is as large as desired. To take the place of the batten, and make the weft threads lie close, an ordinary paper-cutter can be used.

WEDGE, Experiment with. Hinge together two boards about a foot square, or fasten them with leather on one side. Cut a piece of wood into wedge shape and place it inside the hinged boards between two lead-pencils, used as rollers. The small end of the wedge must be turned outward, and its angle must be less than that made by the hinged boards. On pressing the boards together, the wedge, instead of rolling inward on the pencils, as might have been expected, is pressed outward. This is because the wedge tends to move in the direction which allows the boards to come nearest together. If the wedge moved inward the pencils would also roll inward, and force the boards farther apart. If the angle of the wedge be equal to that of the boards, it will not move at

all when the boards are pressed; and if the angle is greater, it will move inward.

WEIGHING IN WATER, Experiments on. 1. Weigh a piece of metal or stone with a pair of scales. Then tie the object to one of the scale pans with a piece of string and let it hang in a glass of water while weighing it. It will be found to weigh less than before. This is because the water partly supports the weight of the object.

2. Fill a goblet with water so that it runs over, and then float on it a block of wood. Some of the water in the glass will be forced out by the wood. Balance an empty glass on a pair of scales. Place the wood in the opposite scale and balance it by pouring water into the glass. Pour this water into the first goblet used, and it will just fill it again. The reason is that any floating body displaces a quantity of water exactly equal to its own weight.

3. Balance a glass of water on one pair of scales and hang a piece of lead from one pan of another pair, balancing this also by weights. Let the lead dip into the water, when both balances will be destroyed—the pan containing the water growing heavier and that with the lead growing lighter. Restore the balance again in both cases by pouring sand into the lighter pan. Afterward balance these quantities of sand against each other, and they will be found to be equal. The reason is that the water bears up part of the weight of the lead, but adds to its own weight in so doing by an equal amount.

WHAT IS MY THOUGHT LIKE?

A game in which one of the players thinks of an object and then asks each of the others to guess what that thought is like. When all have answered, the questioner then tells his thought, and asks each of the company to tell how his guess

resembles it. Much skill is often required to give a good answer.

In another form of the game each writes the names of two objects on separate slips of paper, and when all the slips have been well mixed each draws two. Each then writes in verse the resemblance between them, and finally all the verses are read aloud. This game is sometimes called Resemblances.

WHIRLWIND, THE. A game played by any number of persons, all but one sitting in chairs placed close together in a circle. The players face inward and one stands in the centre of the circle, leaving one chair unoccupied. At a signal each player changes to the chair just at his right, and then to the next one, the whole circle moving around thus as fast as possible. The player in the middle tries to secure a chair, and when he does so the one on his right must take his place.

WHIRLWIND BOX. An arrangement by which a little whirlwind can be made. Take a soap-box, remove the bottom and fasten the



Whirlwind Box.

cover to the box with hinges, so that it will open and shut like a door. Place a handful of small bits of tissue paper in front of the box, and shut or open the door suddenly. There will be a miniature whirlwind, as is shown by the motion of the bits of paper,

WHIST. A game of cards played with a full pack by four persons, two in partnership against the other two. The cards rank in order as follows : Ace, King, Queen, Knave, Ten, Nine, Eight, Seven, Six, Five, Four, Three, Two, the last being the lowest. In cutting for deal, however, the Ace is the lowest card. Partners are generally decided by cutting the cards, the two highest and the two lowest playing together. The one cutting the lowest card is the dealer. Each player deals in his turn, and the right of dealing goes to the left. The partner of the dealer shuffles the cards for the ensuing deal, and must place them to the left of the next dealer. The player on the dealer's right cuts the pack, and in dividing it must not leave fewer than four cards in either packet. The dealer, beginning with the player at his left, deals one card at a time to each until the whole pack is dealt, thus giving to each player thirteen cards. The last, or trump card, is turned face up on the table, and remains there until the first trick has been played, when the dealer takes it into his own hand. Two packs of cards are usually played with, to save time, the second pack being shuffled while the dealer is dealing the first. The thirteen cards received by each player is termed a hand, and the four hands termed a deal. The player at the left of the dealer leads. Each must follow suit, if he can, and the highest card of the suit led wins the trick. The winner of the trick then leads, playing a card of any suit he chooses, and so on in turn until all the cards, making thirteen tricks, have been played. If a player be not able to follow suit, he may play a trump or a card of any other suit he chooses. If he trump, he wins the trick (as trumps take all other suits), unless another player trumps over him—that is, plays a higher trump. A player renounces when he does not follow suit ; if he renounces, and has cards in that suit, he revokes. When

all the cards have been played out the side having the most tricks counts towards game one point for each trick taken in excess of six tricks. Thus, the side making seven tricks scores one point, eight tricks two points, and so on.

The game of ten points, called Long Whist, in which honors are scored, is now seldom played. The Honors are the Ace, King, Queen, and Knave of trumps. If two partners hold all four of these, either separately or together, they score four points towards the game. If they hold any three of them, they score two points. When each party holds two honors—that is, when they are evenly divided—neither party scores, and it is then said that "honors are easy." The honors can be counted only by those to whom they have been dealt, and not by those who win them in playing. They must be announced at the end of the hand, and before the first card of the next hand is dealt, or they cannot be counted.

Short Whist, a game of five points where honors are scored, is usually played in England. In playing a rubber—which is the best two out of three games—the winners gain (1) a treble, or gain of three points, when their adversaries have not scored ; (2) a double, or gain of two points, when their adversaries have scored less than three ; (3) a single, or gain of one point, when their adversaries have scored three or four. The winners of the rubber gain two points, called the rubber points, in addition to the value of their games. When the rubber consists of three games the number of points made by the losers is deducted from the number made by the winners.

The American game is of seven points without honors.

A good player usually leads from the suit in which he has most cards (called his "long suit"). The reason of this is that he wishes to draw all the other cards of that suit from the

other players. Then, when all the trumps have been played, if he gets the lead he can take a trick with every remaining card of the suit, no matter how small it is. When a player has enough of the highest cards in a suit to win all the others from the other players, he is said to have "complete command" of it. If he has the highest cards, but not enough to win all the others, he has temporary command. When complete command of a suit has been obtained, as described above, it is said to be "established." A player will know by his partner's lead what the latter's long suit is, and can aid him in establishing it by leading it in turn. As the success of this plan depends on getting an opponent's trumps out of the way, a good player leads trumps if he have as many as five, even if they are small ones. The particular cards that should be led in different cases are given in the rhyming rules below.

On the *first* round of a suit second in hand should usually play high, if had it been his lead he would lead high, and low if he would lead low, but on the *second* round he should play the winning card. The second player should not trump if he has many trumps, but wait till, by leading them, he may exhaust those of his opponents. But if he have only two or three, the best way to use them is in trumping.

The third player is expected to take the trick, if his partner has not done so, or at any rate to play his best card, so that the trick will cost the fourth player as dear as possible. But if he hold the highest card out and the second below it, he often plays the latter, which is called "finessing." The reason for doing this is that the chances are two to one that the fourth player does not hold the next to the highest card. If he does, the third player loses no more than he would have done by any other play: if he does not, a trick is won. This combination

of cards—for instance, Ace and Queen, or King and Knave—is called a Tenace (French, *tenace*, strong), and the third player is said to "finesse against" the middle card. A player should particularly watch his left-hand neighbor; for if the latter prove weak in any suit it is not necessary for the former to play so high, when he is third in order.

The fourth player should, of course, take the trick with as small a card as he can, if his partner has not already taken it.

When anyone leads a suit in which he knows another player has no card, he is said to "force" that player, for he gives him no choice except to lose the trick or to trump. It is generally considered bad for a player to force his partner when that player has few trumps, for it is then probable that his partner has many, which he wishes to keep till he can lead them. But if he has found out that his partner does not wish to lead trumps, or that the opponents do, then he should force. It is always right to force the strong trump hand of an opponent.

When a player has no cards of one suit and his partner has none of another suit, it is often of advantage for them to lead those suits alternately. Thus, suppose A has no Spades and B has no Hearts. When they discover that this is the case, A leads a Heart, which B trumps, and then returns a Spade, which A trumps. This is called cross-ruffing, or seesawing. If a player sees that his opponents are likely to establish a cross-ruff, he should at once lead a trump, no matter how low; for even if the trick is taken, it requires two of the enemy's trumps to do it, while in a cross-ruff each of those trumps would take a trick.

When a suit is led in which a player has no cards, and he either cannot trump or does not wish to do so, he puts on the smallest card of

his weakest suit. This is called "throwing away" or "discarding." When a player is strong in trumps and wishes them led, it is customary to make what is called the "signal for trumps" or "trump signal." This is done by discarding first a rather high card and then a lower one, instead of the lower one first, as would be the ordinary rule.

Directions how to play Whist have been put in rhyme by William Pole. Some of them are given below :

Your first lead makes your partner understand
What is the chief component of your hand;
And hence there is necessity the strongest
That your first lead be from your suit that's
longest.

In this, with Ace and King, lead King, then
Ace;
With King and Queen, King also has first
place;
With Ace, Queen, Knave, lead Ace, and then
the Queen;
With Ace, four small ones, Ace should first be
seen;
With Queen, Knave, Ten, you let the Queen
precede;
In other cases, you the lowest lead.

Ere you return your friend's, your own suit
play;
But trumps you must return without delay.
When you return your partner's lead, take
pains
To lead him back the best your hand contains.
If you received not more than three at first,
If you had more, you may return the worst.

If second hand, your lowest should be played,
Unless you mean "trump signal" to be made;
Or, if you've King and Queen or Ace and King,
Then one of these will be the proper thing.

Mind well the rules for trumps—you'll often
need them.
When you hold five, 'tis always right to lead
them;
Or if the lead won't come in time to you;
Then signal to your partner so to do.

When, second hand, a doubtful trick you see,
Don't trump it if you hold more trumps than
three;
But having three or less, trump fearlessly.

When weak in trumps yourself, don't force
your friend,
But always force the adverse strong trump
hand.

For sequences stern custom has decreed
The lowest you must play, if you don't lead.
When you discard, weak suit you ought to
choose,
For strong ones are too valuable to lose.

While many of these plays are in
use, the American leads are con-

sidered better on account of showing
number in suit.

SUITS WITH ACE AT HEAD.

Holding Ace, King, and three or
more small ones, lead Ace, then
King.

Holding Ace, King, and two
small ones, lead King, then Ace.

Holding Ace, King, Queen, and
one small one, lead King, then
Queen.

Holding Ace, King, Queen, and
more than one small one, lead
Queen, then Ace with five, King
with more than five.

Holding Ace, King, Queen,
Knave, lead King, then Knave.

Holding Ace, King, Queen,
Knave, and small one, lead Knave,
then Ace with five, King with six,
and Queen with more than six.

Holding Ace, Queen, Knave, Ten,
lead Ace, then Ten.

Holding Ace, Queen, Knave, and
one small one, lead Ace, then
Queen. With two or more small
ones follow the Ace with Knave.

Holding Ace and four or more
small ones, lead Ace, and follow
with fourth best. Many players
lead fourth best.

IN TRUMPS.

Holding Ace, King and five, lead
Ace, then King. Holding less than
five, lead fourth best.

Holding Ace, King, Queen,
Knave, lead King, then Knave.

All other suits headed by Ace are
the same as in plain suits.

SUITS WITH KING AT HEAD.

Holding King, Queen, Knave,
and Ten, lead King and follow with
Ten.

Holding King, Queen, Knave, and
more than one small card, lead
Knave. If you have five in suit,
follow with King; if more than five,
with Queen.

Holding King, Queen, Knave,
with or without one small card, lead
King, then Knave.

Holding King, Queen, and small
cards, trumps, lead Queen, if you

have seven or more in suit, or if you hold the Ten with five in suit. If you have fewer than seven trumps, or do not hold the Ten, lead the fourth best card.

Holding King, Queen, and small cards, common suits, lead King, if you have four or less than four; if more than four, lead Queen.

Holding King, Knave, Ten, Nine, with or without small cards, lead Nine. If the Nine wins, follow with Knave, if you have four in suit; with Ten, if you have more than four. But if the Nine forces the Queen, or Queen and Ace, follow with King, if you have four in suit; with Knave, if five; and with Ten, if more than five.

Holding King, Knave, and Ten, alone, lead Ten; with small ones, lead fourth best.

Holding King, Knave, and small cards, or King and small cards, lead the fourth best.

SUITS WITH QUEEN AT HEAD.

Holding Queen, Knave, Ten, and Nine, with or without small cards, lead Ten. If you have four in suit, follow with Queen; if more than four, with Knave.

Holding Queen, Knave, and small cards, or Queen and small cards, lead the fourth best.

SUITS WITH KNAVE AT HEAD.

Holding Knave, Ten, Nine, Eight, with or without small cards, lead the Eight. If you have four in suit, follow with Knave; if five, with Ten; and with more than five, with Nine.

Holding Knave, Ten, Nine, and small cards, or Knave and small cards, lead the fourth best.

SUITS WITHOUT HONORS.

Holding four or more small cards, lead the fourth best.

RULES.

The following general rules will enable the learner to remember the leads:

Lead the Ace, if you have King and more than four in suit (except

in trumps), or if you hold Queen and Knave also.

Never lead the King with more than four in suit.

Never lead the Queen with less than five in suit.

Never lead the Knave with less than five in suit. If you lead Ace from a long suit, and do not hold King, or Queen and Knave, follow with your original fourth best. When the Queen, led from a King-Queen suit wins, follow with the fourth best remaining.

In opening a suit with a low card, lead the fourth best.

Never lead from a single card, as it is apt to mislead your partner.

Dummy. This is played by three persons, a fourth hand, called Dummy, being exposed on the table. The laws are the same as those of Whist, with the exception that (1) Dummy deals at the commencement of each rubber; (2) Dummy is not liable to the penalty for a revoke; (3) Dummy's partner is not liable to any penalty for an error whence he can gain no advantage.

Double Dummy is played by two persons, each having a dummy, or exposed hand, for his partner. The laws are the same as in Dummy Whist, except that there is no misdeal.

RULES OF THE GAME.

1. If there is a misdeal, the deal passes to the next player, unless the mistake was caused by an interruption from an opponent, in which case the same player deals again.

2. If a card be exposed by a player, a new deal by the same dealer may be demanded by his opponents, if they have not looked at their hands.

3. A player must not deal for his partner without his opponents' permission.

4. The dealer must take the trump into his hand after his first play, and after that no one may ask what it is, but any one may ask what the trump suit is.

5. A card wrongly exposed on the

table must be played whenever it is called for, unless so playing it would cause a revoke.

6. If a player lead out of turn, he must take back his card, which is treated as exposed; but if all the others have played to the lead, it is considered good.

7. If the third hand play before the second the fourth may also play before the second.

8. If the third hand have not played, and the fourth play before his partner, the latter may be called on to win or not to win the trick.

9. If a player revoke, his opponent may score 2 points, unless he discover his error before the trick is turned and quitted, in which case he may change his play, and the wrongly played card is simply treated as exposed.

10. A revoke cannot be claimed after the cards have been cut for the following deal.

11. After a trick has been turned and quitted it cannot be looked at.

Bridge Whist. A game that is played, after the lead of the first card, like Dummy Whist.

The differences lie mainly in the declaration of trumps, the differing values of suits, increasing values by going over, methods of scoring and rubber count.

The dealer does not turn a trump. He has the option of making it, but if he does not wish to do so his partner must make it.

The value of the tricks above six varies as follows, according to the trumps declared—spades count 2, clubs 4, diamonds 6, hearts 8, and "no trump" 12. After the declaration of trump suit the adversaries have the right to *go over* (that is, double the value); the dealer's left-hand adversary having the first right to do so; if he does not wish to *go over*, or double, he says to his partner, "May I play?" His partner must answer "Play" or "Over." If either adversary goes over, the dealer and his partner have the right to go

over them, the player who declared the trump having the first right; and the going over may be repeated until both side are satisfied. After the leader—the player at left of dealer—plays his first card, the dealer's partner places his hand on the table face up and the dealer plays it as in Dummy Whist.

Honors are Ace, King, Queen, Jack, and Ten of the trump, or the four aces when "no trump" is declared. Honors are credited to the original holders, and are valued as follows: Three honors held between the partners (called simple honors) count the same as two tricks, four honors are equal to four tricks, five honors equal to five tricks, four honors in one hand equal to eight tricks, four in one hand and the fifth in partner's equal to nine tricks, and five honors in one hand equal to ten tricks.

In "no trump" three aces between partners count thirty, four aces between partners forty, and four aces in one hand one hundred.

Slam is thirteen tricks scored independently of the revoke penalty, and adds forty to the honor count.

Little Slam is twelve tricks similarly counted, and adds twenty to the honor count.

Chicane (one hand void of trumps) is equal in value to simple honors; that is, if partner of player having Chicane scores honors, he adds the value of three honors to his score; while if the adversaries score honors it deducts an equal value from them.

The value of honors, Slam, Little Slam, and Chicane is in no wise affected by going over.

Each game consists of thirty trick points. The rubber is the best of three games; if the first two games be won by the same partners the third is not played. Tricks and honors are scored in separate columns.

At the conclusion of a rubber the total score for tricks and honors is added up and 100 added to the winners' score—the lesser score is then

deducted from the greater, the remainder being the value of the rubber.

The penalty for a revoke is at the option of the adversaries, who may at the end of the hand take three tricks from the revoking player and add them to their own, deduct the value of three tricks (in the hand where the revoke occurred) from the score of the adversaries, or add the value of three tricks to their own score.

The penalty for a revoke takes precedence of all other scores.

Dummy is not liable to the penalty for a revoke. No player should purposely incur a penalty because he is willing to pay it, nor should he make a second revoke to conceal a first one.

Duplicate Whist is that form of the game of Whist in which each deal is played only once by each player, but in which each hand is played over again so as to bring the play of teams, pairs, or individuals into comparison.

Each player, when it is his turn to play, must place his card face up before him, leaving it there until all have played to the trick, when he must turn it over with the ends towards the winners of the trick. When the deal is played each player must place his hand in the tray or other device, face down, and the trump card is placed face up on top of the dealer's hand.

The points made on each deal are recorded on score cards made for that purpose, as the game of seven points is not played in Duplicate Whist.

loralache, or Russian Whist. This is exactly like our Whist, except that there are no trumps. The scoring varies according to agreement, but is generally as in Long Whist.

History. The game of Whist is traced back by some to the Italian *Trionfo*, the French *Triomphe*, one of the first card games; but others say that the game of Trump, from which Whist is derived, was not the same as these games, and originated in England. Trump was played in

England in the beginning of the 16th century and was probably very similar to the game of Ruff and Honors, or Slam, which followed it. Ruff and Honors was played by four persons with a full pack of 52 cards, but only twelve were dealt to each, four being left in the stock, the topmost card of which was turned for trump. The holder of the ace of trumps was allowed to exchange four cards for those in the stock, and the game was nine points; but in other respects the game was like Long Whist. The first known mention of Whist in print was in a book called "The Motto," published in 1621, where it is spelled Whisk. The earliest known use of the present spelling is in Butler's "Hudibras" (1663). For about fifty years after this it was spelled indifferently either way. Cotton, in his "Compleat Gamester" (1674), says: "Whist is a game not differing much from this [Ruff and Honors], only they put out the Deuces and take in no stock." The game was thus played with 48 cards. Whist is mentioned in George Farquhar's play of "The Beaux's Stratagem" (1707), and in 1715 Alexander Pope speaks of it in one of his epistles. About 1725 the game was made ten points, and began to be played with 52 cards again. In "Whist-and-Swabbers," which was much played about this time, certain cards called Swabbers entitled their holders to part of the money wagered on the game, no matter who the winners might be.

The game was much studied by a party of gentlemen who frequented the Crown Coffee House in London in 1730, and then it began to be played in its modern form. Richard Seymour, in his "Compleat Gamester, for the use of the Young Princesses," published in 1734, has an article on "Whist, vulgarly called Whisk." He gives an account of the game as it was played in his time, from which it appears that it was then much used by card-sharpers, a

full account of their various methods of cheating being given, with the way to defeat them. "Formerly," he says, "it was usual to deal four cards together; but it is demonstrable there is no safety in that method; but now the cards are dealt round one and one at a time, as the securest and best way." It also appears from this book that two-handed and three-handed Whist were sometimes played. In the latter, each player had twelve cards, and, says Seymour, "always two strive to suppress and keep down the rising man." About this time Whist began to be a fashionable game, and in 1743 appeared an anonymous treatise upon it, of which it is thought Edmund Hoyle was the author. At this time Hoyle gave lessons in Whist for a guinea each, and he did so much for the game that he is often called the "father of Whist." It was then thought necessary for all well-educated people to know how to play it. In the "Rambler" for May 8, 1750, occurs the passage, "Papa made me drudge at Whist till I was tired of it; and Mr. Hoyle, when he had not given me above forty lessons, said I was one of his best scholars." Since Hoyle's time there have been many writers on the game.

Whist had been treated as though the art of the game depended on arbitrary rules, but it is now granted that all rules for play depend on general principles. The modern game is but an elaboration of the old one. Before Hoyle, Matthews had an idea of the discard, which is now accepted by all advanced players. In the writings of Deschappelles, a noted French player, and of Clay, Drayson, and Cavenish, celebrated English players, the rules of the Crown Coffee House (1728) are still the important ones. They were (1) "Lead from your strong suit. (2) Study your partner's hand. (3) Attend to the score." Hoyle understood that it was neces-

sary to unblock, without knowing how to do it systematically. These writers all had a desire to show length and strength of suit, which has been met by N. B. Trist, of New Orleans, who, in American Leads, proposes a systematic course of play when opening, and continuing leads from strong suits. Within the last forty years Short Whist has been substituted for Long Whist in England. The signal for trumps has also been introduced, and is now recognized as legitimate, although at first it was strongly opposed by many of the best players.

Whist means silence; and it is supposed that the game was so named from the necessity of silence while it is being played.

WHISTLE. Experiment with a. Fit over the mouth-piece of a toy fife or whistle the end of a rubber tube several feet long. Blow through the tube, and at the same time swing the whistle around in a circle so that it will sound while swinging. If a person twenty or thirty feet distant listens to the whistle, he will hear its sound grow alternately sharper and flatter, as it approaches him and recedes from him. This is because the pitch of sound depends on the speed with which the sound-waves reach the ear, and they get to the ear faster when the sounding body itself is moving toward the listener.

WHO WAS HE? A game played by any number of persons. One begins by giving a brief sketch of some historical character, and then asking "Who was he?" He who makes the first correct answer gives another similar sketch, and so on as long as the players choose.

WICKET. See CRICKET.

WINDMILL, THE. A SOLITAIRE game of CARDS, played with two packs. An Ace is placed on the table to begin with, and the first eight cards played are laid in order in a circle around it, so as to resemble the sails of a windmill, but

leaving a space within. In this space the first four Kings are placed, one above the Ace, one be-

low it, and one on each side. One family is to be formed on each of the Kings by piling downward, and



The Windmill.

four families on the Ace by piling upward, beginning another family with another Ace when the one before it is completed. Suit need not be followed in any of the piles. In piling, the sails of the windmill may be used, each being at once replaced by the next card played. Useless cards are laid aside to form stock, of which the top card can be used at any time, instead of playing from the pack.

WINE GLASSES, Experiments with. 1. Dip two wine glasses under water, and while they are there bring them mouth to mouth, seeing that both are completely full. Lift them out together and stand them on the table, one being on the other and both still full of water. It will be found that the upper one can be lifted up a very little way without any of the water running out. Holding it in this way, pour slowly on the foot of the upper glass some red wine, or some alcohol colored with carmine. (See

Fig. 1.) It will run off the foot in drops, fall on the side of the



Fig. 1.

glass and trickle down to the open space between the two glasses,

when it will enter the water and rise into the upper glass. The water in the upper glass can, with

or sink. A piece of glass may be used instead of paper; but if the tumbler be tilted a little to one side it will slide off. To prevent this, bits of cork may be glued to it on the inside.

4. Place a lighted candle in a goblet or large wine glass. After it has burned a few seconds, lay on the glass a piece of wet paper having a hole cut in the middle, and then press down on it another glass inverted. The paper is to make the two glasses fit together very tightly. Soon after the upper glass has been pressed down on the lower, the candle will go out for want of air, and it will be found that the two glasses stick together very tightly, so that the lower can be lifted by the upper, and so that it requires considerable force to pull them apart. This is because some of the air inside, heated by the candle, has risen out of the glass, so that the

Fig. 2.

care, be colored red in this way, while that in the lower glass remains transparent. The wine or alcohol rises in the water because it is lighter.

2. Fill a soup plate with water, and on a cork or an inverted butter plate in the middle place a crumpled piece of paper as large as one's fist. Set fire to it and at once turn a goblet over it. The water will be drawn up into the goblet. (See Fig. 2.) The reason is that the paper, in burning, exhausts the oxygen under the goblet, reducing the pressure there, and the pressure of the outside air then forces up the water.

3. Fill a glass with water so that it almost overflows, and then place over it a sheet of paper which touches both the edge of the glass and the surface of the water. Turn the glass upside down, and the water will not run out. (See Fig. 3.) To guard against accidents, this should be done over a basin

Fig. 3.

pressure outside is greater than that within, and the two glasses are thus held together.

WIZARD OF THE EAST. See GUESSING THE SIGN.

WOLF. An outdoor hiding game, played by any number of persons. One of the players, chosen Wolf by COUNTING OUT, hides, while the rest of the party stay near the goal or bye, which may be a tree, stone, or other object. When they have waited a minute or so,

they cry out "Coming! say nothing!" and, if there is no reply, they go out in different directions to look for the Wolf. If the Wolf is not ready when he hears the cry he must shout "No!" and the others must then wait a reasonable time before they shout again. When any one finds the Wolf he cries "Wolf!" to let the others know, and all then run to the goal. If the Wolf can touch any of them before they reach it, the ones caught become Wolves also, and hide with him next time; but if he catches no one he must hide again alone. The game goes on till all are Wolves and the first one caught by the Wolf is Wolf at the beginning of the next game. The Wolf often does not wait to be found, but runs out whenever he thinks there is a good chance to catch any one. If he can get to the goal before any of the others he can generally touch many of them as they come in. In such a case one of the best runners can often lead the Wolf away on a chase while the others run in to the goal. The game may be blocked by the Wolf's keeping close to the goal in such a case, or by his insisting on chasing a player he cannot catch. The players, therefore, before the game, should agree either that the Wolf must select some one player to pursue, and allow that player to return to goal if not caught in a certain time, or that all the players must run in to goal, letting the Wolf touch whom he can. When there are several Wolves they may hide in the same place or different places, as they choose, and any one of them may run out when he pleases. If the Wolves arrange among them where they shall hide and how they shall run out, they usually succeed in catching more players than when each follows a method of his own. Any player

who wishes may remain at the goal, instead of running out to look for the Wolves.

This game is sometimes called "Whoop" in England. There is never more than one player that hides, and he tries to catch but one. The one caught carries his captor to the goal on his back, and then hides in his turn.

WORD MAKING AND WORD TAKING. See LOGOMACHY.

WRESTLING. A sport in which one person tries to throw another to the ground. There are several kinds, which differ chiefly in the manner in which the contestants are

Wrestling—Fig. 1.

allowed to hold one another. The simplest and best kind for boys is the kind first practised in Cumberland, England. In this country this form of wrestling is commonly called "backhold" catch. In it the contestants are allowed to hold each other in only one way, which is arranged before the wrestling begins. The wrestlers stand chest to chest, each placing his chin on the other's shoulder and grasping him around the body, as shown in Fig. 1, the right arm of each being under his opponent's left. They are allowed to use every means to throw each other, except kicking or similar injury, and if either con-

testant unclasps his hands he is regarded as beaten, just as if he had been thrown. A wrestler is considered thrown when both shoulders

of his adversary, and pulls him backward. To meet this the opponent should lean forward and strengthen his hold.

The Click. The wrestler pulls his opponent forward to make him resist by dragging back, and then suddenly ceasing, trips him up with one foot.

The Hips. The wrestler forces his shoulder under his adversary's right arm, lifts him up as far as possible, and at the same time catching the opponent's left leg with his right, drags it up. If properly done, this brings the opponent down on his back. The hips may be performed with the left shoulder and leg; and though this is not so easy, if it fails, the wrestler is left in a position for a Buttock.

Dog Fall. This occurs when both wrestlers fall to the ground together. They must then break their hold, rise, and begin the contest anew.

Wrestling—Fig. 2.

ders touch the floor. The object of each contestant in this kind of wrestling should be to force his right shoulder beneath his opponent's arm-pit. To prevent this, the latter must keep his left arm pressed in as far as possible. Each tries to throw the other by swinging him sidewise, pulling him forward, or pushing him backward, at the same time trying to trip him in various ways. Some of the devices employed are described below.

The Back-heel. The wrestler puts his foot behind his opponent's heel and tries to bend him over it. To meet this, the latter may loosen his hold or turn his side.

The Buttock. The wrestler turns as far as he can to the right, then he straightens up and at the same time throws his left leg back of his opponent's left, which will enable him to bend him over backward for a fall by doubling him over his hip. To meet this the opponent will hold him tight, and at the moment of his trying to trip, he will endeavor to lock his left leg from the inside around the left of his adversary, and then bend him over backward for a fall. This last is called a "back-hank."

The Hank. The wrestler turns sidewise, twists his leg about that

Wrestling—Fig. 3.

In another method, the hold is not arranged at the beginning of the contest, but the wrestlers stand face to face with their hands held out before them, as shown in Fig. 2.

The object of each is now to seize his opponent under the latter's arms which is called getting the "underhold," and is an advantage. In Fig. 3 the boy whose back is toward the spectator has the underhold. The opponent tries to prevent this by pushing aside his hands. Neither may succeed in getting the underhold, in which case the wrestling is similar to that just described. If either get the underhold, he may throw his opponent by lifting him up bodily or by drawing him forward by the waist and pushing backward against his breast, as well

the cut. Fig. 6 shows a method of throwing by a leg grip.

In Collar and Elbow, or Cornish wrestling, the hold is by the jacket,

Wrestling—Fig. 4.

as in the other ways described. Sometimes tripping is not allowed in this kind of wrestling, and sometimes several other holds are allowed, such as seizing the head with one or both hands or with the arm taking the shoulders or arms with one or both hands; seizing the legs; or a combination of any two of these holds.

In the shoulder grip, shown in Fig. 4, the wrestler seizes his opponent by the shoulders with both hands, pulls him outwards, to right or left, and throws him with a sudden jerk, using any trip that is available.

One of the arm grips is shown in Fig. 5, where the wrestler seizes his opponent with both hands by the left fore-arm, pulls him quickly forward, and, putting the arm over his shoulder, throws him, as shown in

Wrestling—Fig. 5.

as the name indicates. When the contestants are allowed to take any hold they please above the waist, the method is called "Græco Roman;" and when any hold whatever is permitted, it is called

Wrestling—Fig. 6.

"Catch as Catch Can." The rules of the kinds of wrestling most generally used in public contests in this country are given below.

COLLAR AND ELBOW.

1. The men shall wear short coats or jackets made of canvas, not extending below the hips, with strong

Wrestling—Fig. 7.

collar and elbow, suitable for the grasp of an opponent. They shall wear rubber sandals on the feet.

2. Each man shall take hold of the collar of his opponent with his right hand, while with the left hand he must take hold of the right elbow.

3. Both men shall stand up breast and breast, with limber arms, and show fair and equal play with the feet.

4. Either man breaking his hold with one or both hands, to save himself from a fall, shall forfeit said fall.

5. All falls must be square back falls; either two hips and one shoulder or two shoulders and one hip to be on the carpet simultaneously, to constitute a fall.

6. Striking upon the face, side or knees is no fall, and nothing shall be allowed for forcing a man from such positions to his back. Going down on one or both knees is fair, as long as no holds are broken.

7. A rest of at least ten and not more than twenty minutes shall be allowed between each fall.

8. The first fall, best two in three or three in five, shall win, according to mutual agreement.

9. The ring shall be twenty-four feet square, and nobody shall be allowed inside except the referee and two umpires.

CATCH AS CATCH CAN.

1. The contestants can take any hold, trip or lock they please.

2. To constitute a fall, two shoulders must strike the floor simultaneously.

3. Long or short drawers must be worn, and nothing heavier for the feet will be allowed than socks and thin slippers.

4. A rest of at least ten and not more than twenty minutes shall be allowed between each fall.

5. The umpires shall take their positions at a proper distance from the contestants, and there remain, and will not be allowed to talk to or advise the principals during the contest. They shall however have the right to call the attention of the referee to any point which, in their judgment, may require his decision.

6. Doing anything to injure an opponent shall be considered foul. For each violation of this rule the offender shall be deemed to have lost a fall, and the referee shall have the power to award the match to the injured party.

*Wrestling—Fig. 8.**GRABCO-ROMAN.*

1. Wrestlers are allowed to take hold anywhere between the head and the belt or waist. Grasping the legs is strictly forbidden.

2. The men shall use open hands, and are not allowed to strike or catch, to clasp one of their own limbs within the other, nor interlace their fingers; but they can clasp their own wrists, to tighten their hold around their opponent's body or otherwise.

3. The principals shall have their finger-nails and hair cut short, and must wrestle either barefooted or in their socks.

4. Should a wrestler fall on his knee, shoulder or side, a new start must be made.

5. Should the principals roll over each other, the one whose shoulder shall touch the ground first is deemed conquered.

6. A rest of not less than ten nor more than twenty-five minutes shall be allowed between each bout.

7. Two shoulders touching the ground simultaneously constitutes a fall.

History. Wrestling contests have been held since the earliest times. They formed part of the Greek athletic games. At first the Greeks used to wear belts in these contests,

Wrestling—Fig. 9.

but finally their use was forbidden and the wrestlers contended naked, their bodies being made slippery with oil. In the middle ages wrestling was a sport only among the lower classes, though knights and nobles often looked on at wrestling bouts. They were very rough, and the wrestlers were frequently maimed or even killed. A mediæval wrestling match is shown in Fig. 7. Fig. 8, from an old manuscript, shows an early English wrestling match in which the contestants mounted on the shoulders of other men. In early times (14th and 15th centuries), in England, such matches

were held on feast days before the Lord Mayor and aldermen of London, dressed in their robes of office. After the Reformation the sport was not in favor, yet it was kept up in the west and north of England and by students at the Universities. Advocates of athletic sports tried hard to bring it into favor again, but physicians thought it caused rheumatism and ague, and it was not until about 1826 that it began to be revived. Since that time it has been popular.

The Japanese are famous wrestlers. Fig. 9 shows one of their contests.

Y

YACHTING. Much information about different kinds of boats and rigging will be found in the article **SAILING**. There are now in this country about 75 yacht clubs, 20 of which are in New York and 10 in Boston. Only a few of the boats are large racers, the great majority of the 2000 boats on the official lists being comparatively small. Besides these, there are many thousand others whose owners belong to no club. The yacht clubs all hold races once or twice a year, and offer prizes for the fastest yacht. As the boats are of many different sizes, what is called a system of time-allowances is adopted, that small boats may race on even terms with larger ones. The object is to give a greater time-allowance the smaller the boat, and then credit it with the difference between this calculated time and the real time. Thus the time-allowance of a small boat may be 2 minutes per mile. If the course is 20 miles long, and she makes it in 80 minutes, her corrected time would be 80-40, or 40; while a larger boat, with a time-allowance of half a minute, whose actual time was but 56 minutes, would be credited with 56-10 or 46, and would therefore be beaten. There has been much discussion over the proper method of calculating time-allowances, and each club generally adopts its own rules. The English rule is based on the length and beam, which is one reason why English yachts are so narrow, the time-allowance being thus larger. The New York clubs use now a measurement based on sail-area and length, and the New England Racing Association one based on length alone. In the former system the allowance varies from nothing for the largest yacht up to 136 seconds per mile for the

smallest; and in the latter, from nothing for a boat 116 feet long up to 5 minutes 29 seconds for one only 12 feet long. The yachts in a club are usually divided into classes, according to their rig and measurement for time-allowance.

Steam launches and yachts. Steam launches are usually long and narrow, and have no decks. The boiler, which is upright, is placed in the centre of the boat, the engine aft, and the boat is driven by a screw propeller. The length varies from thirty to forty feet, the beam from seven to nine, and the draft from two and a half to three feet.

Steam yachts are larger than launches, with decks and cabins, and some of them are fitted up with great magnificence. The largest steam yacht in this country is the *Alva*, owned by W. K. Vanderbilt, which is 285 feet long and has 32.3 feet beam. Steam yachts generally have also masts and sails, to be used in case of accident to the machinery.

Some steam yachts have what is called a safety-coil boiler, in which a coil of pipe contains the water, and there is no danger of explosion. Small launches have what are called naphtha engines, in which the expansion of a small quantity of naphtha vapor drives the piston. These engines occupy little room, and can be run by any one. To run a steam-engine a license from the United States Government is required. The only steam yacht club in this country is the American Yacht Club, formed in New York in 1883. There are several systems of time-allowance for steam yacht racing, most of which are based simply on the length of the yacht. In the system devised by Dr. C. E. Emery, a yacht 50 feet long is allowed a speed of 9.947

knots an hour, and one of 300 feet 18.074 knots; so that if the former should make 12 knots in a race while the latter made 19, the smaller yacht would be considered the winner. The best recorded time made by a steam yacht was from Larchmont, N. Y., to New London, Conn. (about 90 miles), in 4 hours, 34 minutes, 57 seconds, by the *Atlanta*, July 15, 1886.

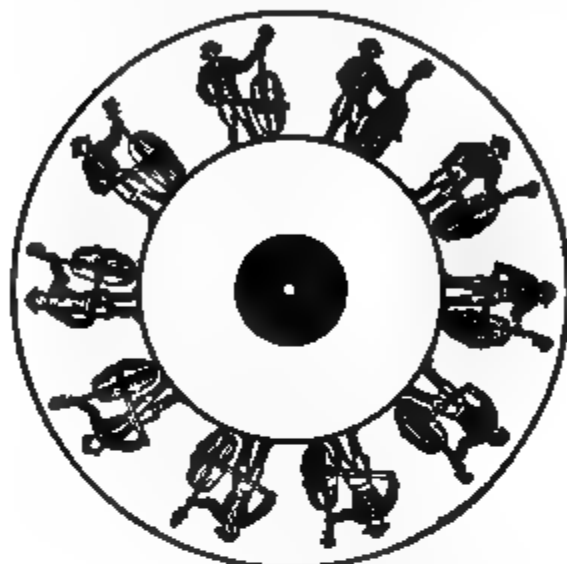
History. Sailing for pleasure is a very old form of amusement. In the 17th century Englishmen were accustomed to buy their pleasure-boats from the Dutch, and called them yachts, from the Dutch *jagt*, a swift form of sailing vessel. The first yacht race on record was in 1661, between Charles II., King of England, and his brother the Duke of York, afterward James II. The first organized yacht club was the Cork Harbor Water Club, of Cork, Ireland, formed in 1720, which was soon followed by the Royal Yacht Club and others in England. The yachts of this period were broad, had blunt or "bluff" bows, and drew but little water. The fourteen sail-boats owned by Charles II. varied in length from 31 to 66 feet, in beam from $12\frac{1}{2}$ to 21.6 feet, and in draught water from 6 to 7.6 feet. Before the present century Americans

adopted a longer, deeper and narrower boat. The English followed, and have gone on in the same direction until the English "cutter" has become the narrowest and deepest of yachts. In this country, on the other hand, the tendency has been to return to boats of the old type, called by some people, in derision, "skimming dishes," because they are broad and shallow. One reason why the English favor such deep boats is because of the rough seas and deep water near England, and deep vessels sail better in very rough water. In this country the first yacht club, the New York Club, was formed in 1844.

In 1851, during the World's Fair in London, a keel schooner-yacht, called the *America*, built for the purpose, was sent to England from New York to compete with English yachts. She raced, Aug. 22, 1851, fifteen English yachts, for a silver cup, and won it. This victory created great interest in yachting in both countries. In 1857 the cup won by the *America* was given by her owners to the New York Yacht Club, to be held till won by some foreign yacht. A list of the races for it, all of which have been held near New York, over a forty mile course, is given in the appendix.

Z

ZOETROPE. A toy by which a succession of figures in different attitudes are made to appear like a single one in motion. The simplest form of the toy consists of two



Zoetrope—Fig. 1.

disks fastened on the same axis six or eight inches apart, so that they will turn on it together. The



Zoetrope—Fig. 2.

figures are arranged on one, as shown in Fig. 1, and in the other are a number of slits equal to that of the figures. The figures repre-

sent some action at successive instants; thus, in the first picture the man has his bow drawn to one side; in the next it is pushed a little farther along, and so on. If any one look through the slits while the discs are turned, and direct his attention to any one spot, he will see a different picture in that spot every time a new slit comes in front of his eye, and he will not see one picture moving away from the spot and another coming up, because the pasteboard

Zoetrope—Fig. 3.

between the slits then comes between. Thus he will see in the same place a succession of momentary pictures, each in a slightly different posture, and it will seem to him as though he saw the man playing the bass viol. In this way an endless variety of movements may be counterfeited.

The disk bearing the figures is often made a little smaller than the one with the slits, and fastened with it on the axis at the same point (see Fig. 2). The observer then looks through the slits at a mirror, and the effect is the same

Zoetrope—Fig. 4.

as before. The zoetrope in this shape is more easy to manage. Another form is a round box, open at the top, which revolves on an upright stand (Fig. 3). The figures are on strips of paper which fit around the inside of the box, and the slits are vertical ones in the edge. Six such slips are shown in Fig. 4. The observer looks through the slits toward the figures on the opposite side of the box. The effect is the same as be-

fore, though in this case the figures and slits are moving in opposite directions. An arrangement has been devised by a Frenchman for showing the zoetrope to a large audience with the aid of the MAGIC LANTERN. The word zoetrope is from the Greek *zoe*, life, and *trepein*, to turn. The toy is also called the Magic Wheel and the Zoōpraxiscope, from the Greek *zoe*, life, *praxis*, action, and *skopein*, to see.



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